This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

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The Precipitating Factors of Coronary Artery Occlusion

—Further Observations on the Mode of Onset of a Large Series of Cases, with Particular Emphasis on the Role of Effort and Excitement—

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CORONARY artery occlusion is of paramount interest to industry for two reasons.* It is so prevalent that any working man or woman over 40 years of age is a possible victim, and, secondly, it has been said that physical strain may precipitate an attack.[1,2]

Up to the present time it has been impossible to cite actual statistics of the frequency of coronary artery occlusion, but we have presented elsewhere[3] indirect evidence that annually at least half a million people sustain attacks of coronary occlusion in this country. The incidence reaches a peak between the ages of 50 and 60 years, but at least 10% of the attacks occur in persons under 40 years of age, and 30% in persons under 50. Hence coronary artery occlusion attacks people in the prime of life, a group comprised largely of workmen.

The assertion that strenuous effort during work may precipitate a coronary artery occlusion raises a definite compensation problem, and we shall cite several compensation cases to show its importance. The first patient was a butcher (C.N.), 54 years old. One morning he had difficulty separating frozen ox-tails in the refrigerator in his shop. Finally he succeeded in filling a large basket with them, carried it up a steep, narrow staircase, and walked 40 feet. As he deposited the box he was seized with severe chest pain. When he was seen by a physician soon thereafter he presented the signs of coronary occlusion. Did the strenuous work induce the occlusion?

Another man, (D.K.), a pharmacist, 39 years of age, stated that he had been entirely well up to 9:30 on a morning when he brought up several bundles from the cellar. At 9:45 he deposited a 30-pound case on the sidewalk. Directly thereafter he experienced what he termed terrific congestion and choking pain in the chest, but he carried the case into the store. His symptoms continued and the doctor who was called in ordered him to bed. An electrocardiogram showed changes typical of coronary occlusion. Did the exertion of climbing the cellar stairs with a load of 30 pounds cause the closure?

Finally, there is the case of a clothing salesman (I.G.), who ran up a flight of 19 steps on a Saturday to get a suit for a customer. Near the top he stumbled, striking the left side of the chest. He experienced pain in this region, but he got the suit and later went home. The pain in the chest persisted that evening and, to a lesser extent, the next day, Sunday. That night at 1:00 A.M. (Monday) he suffered severe precordial pain, for which he was given a hypodermic by a physician. The next day there was a recurrence of pain, requiring a hypodermic. The electrocardiogram was considered typical of coronary occlusion. Was the closure related to the injury to the chest, or to running up the stairs, or to both?

Several years ago we reported[4-6] our observations in 800 attacks of coronary artery occlusion and concluded that physical strain and excitement were not factors in the precipitation of the attack. While many authors have accepted this view, it has been challenged recently by Paterson[1] and Boas,[2] the former on purely theoretical grounds and the latter on the basis of a small number of cases observed by him. For reasons which we shall discuss later, we believe that their conclusions are not justified. The problem can be solved only by the careful observation of large numbers of cases. We are, therefore, presenting in this paper, additional data obtained in 1500 attacks of

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TABLE I

DIFFERENTIATION OF ANGINA PECTORIS FROM CORONARY ARTERY OCCLUSION

	Angina Pectoris	Coronary Artery Occlusion
Exciting cause at onset	Exertion, excitement, food, cold, straining, etc.	None. Frequently at rest or sleep
Duration of pain	Transitory (less than one hour)	Prolonged
Effect of nitro-glycerin	Relieved	Unaffected or intensified
Shock	Absent	Present
Gastro-intestinal symptoms	None	Nausea, vomiting
Cardiac findings	Unchanged	Poor heart sounds, gallop, embryocardia, arrhythmia, pericarditis, heart failure
Blood pressure	Unchanged or may rise	Falls
Lungs	Unchanged	Congestion, pulmonary edema
Blood velocity and vital capacity	Unchanged	Diminished
Laboratory findings	Normal	Fever, leukocytosis, rapid sedimentation rate, azotemia, glycosuria
Electrocardiogram	Unchanged or transitory changes	Definite pattern, progressive changes
Condition after attack	Normal	Prolonged illness
Physio-pathology	Coronary sclerosis, coronary insufficiency, anoxemia	Coronary sclerosis, subintimal hemorrhage, thrombosis, ischemia, infarction

coronary artery occlusion; it will be seen that the evidence confirms our belief that coronary artery occlusion is not induced by external influences.

We wish to emphasize the fact that we are considering only classical coronary artery occlusion. One must sharply differentiate it from angina pectoris due to coronary sclerosis (Table I). The anginal seizure almost always is induced by effort, excitement, cold, or meals. Although the precordial pain in angina pectoris may simulate that in coronary artery occlusion, it is usually transitory and the patient recovers after a brief interval. However, when coronary artery occlusion occurs, there is actual damage in the myocardium; the pain is persistent, signs of cardiac and circulatory failure may appear, and the patient is usually ill for a considerable time.

Another syndrome which should not be con-

TABLE II.

TYPES OF ACTIVITY AT ONSET OF CORONARY ARTERY OCCLUSION

A. Actual Activities (973 attacks)	No.	Pct.
1. Sleep	208	22.3%
2. Rest—lying or sitting down	286	30.7%
3. Ordinary mild activity	190	20.4%
68 in home (dressing, standing, walking about, retiring, talking, playing with children, etc.); 37 in store or office; 14 sitting in car or train; 10 in doctor's office or clinic; 8 doing light housework; 6 getting out of bed; 5 taking shower or bath; 5 getting out of bus or car; 5 playing cards; 4 attending a meeting; 4 sitting in movie; 2 in restaurant; 22 miscellaneous.		
4. Moderate activity (except walking)	84	9.0%
38 at physical work (painter, carpenter, baker, tailor, presser, housewife); 18 driving car; 9 during bowel movement or enema; 6 shopping; 2 coughing; 2 running upstairs; 2 during coitus; 7 miscellaneous.		
5. Walking	146	15.6%
111 in street; 11 upstairs; 6 after meals; 5 against cold wind; 4 uphill; 5 downstairs; 2 in snowstorm; 2 carrying 10 lbs.		
6. Unusual or severe exertion	19	2.0%
9 during or immediately after sport or game (football, swimming, dancing, skating, handball); 6 lifting or moving heavy load; 3 running for train; 1 after long auto ride.		
7. Undetermined	40	

TABLE III.

ASSOCIATED ACTIVITIES AT ONSET OF CORONARY ARTERY OCCLUSION

B. Associated Factors (973 attacks)	No.	Pct.
1. Meals	94	9.7%
38 heavy meals; 33 ordinary meals; 23 light meals; 16 in sleep; 10 while walking.		
2. Excitement	55	5.7%
13 gambling or playing cards; 9 during argument; 4 at movies; 3 news of death of relatives; 3 fright; 3 at wedding or banquet; 2 making speech; 2 during coitus; 1 after auto accident; 1 at funeral; 14 miscellaneous (emotional upset, worry).		
3. Surgical procedures	63	6.5%
26 laparotomy; 20 genito-urinary operation; 7 eye, ear, nose and throat operation; 3 leg operation; 2 thyroidectomy; 1 thoractomy; 1 tooth extraction; 1 incision of furuncle; 1 paravertebral block; 1 bronchoscopy.		
4. Infection	43	4.4%
14 upper respiratory infections; 6 grippe; 6 pneumonia; 5 cholecystitis; 3 pyelonephritis; 2 peritonitis; 2 appendicitis; 3 sepsis; 3 abdominal suppuration.		
5. Miscellaneous	11	1.0%
4 diabetic ketosis; 2 insulin injections; 2 trauma (1 fall on chest and 1 injury to eye); 2 smoking; 1 typhoid injection.		

fused with coronary artery occlusion is coronary insufficiency with myocardial infarction but without occlusion of a coronary artery.[7,8] Coronary insufficiency, as Buchner[7] has shown, produces a characteristic pathological picture. The electrocardiograms published by him and observed by us[9] in such cases are usually distinguishable from those in coronary occlusion; we have also noted differences clinically between coronary insufficiency and coronary occlusion.

Material

WE HAVE collected data in 1500 attacks of coronary artery occlusion in 1135 patients observed in the wards of the Mount Sinai Hospital, New York, and in private practice. It was considered best to omit patients seeking compensation, for they are prone to exaggerate the importance of a particular event in producing the attack. Furthermore, in our experience it is customary to find that the patient did not relate the attack to exertion when his history was taken in a hospital soon after the episode, although he gave a definite history of such an association later at the compensation hearing. Yet one of the authors previously mentioned[2] included five compensation cases.

We have investigated not only the circumstances of the patient at the onset of the attack, but also his activities during the preceding day, and in many cases, during the previous weeks. The histories were elicited with painstaking care; any unusual physical or emotional event was noted.

Such data was obtainable in 973 cases (Tables II and III). Over half of these people were completely inactive when the attack set in; 22% were asleep and 31% completely at rest. Only 2% were performing some strenuous or exceptional activity, such as engaging in one of the sports, dancing, lifting a heavy weight or running for a train (Table II), and often the patient was accustomed to such exertion. In the majority of attacks associated with some activity, the latter was mild and routine; for example, the patient was at home dressing, about to retire, playing with the children, taking a shower; or he was in his store or office, sitting in a theatre, train or restaurant. Fifteen per cent were walking, usually casually. In 9%, the effort was of moderate severity, but was the usual occupation of the patient, such as working as a presser, baker or tailor, driving a car, or shopping.

In 266 of these attacks the onset occurred during rest or mild activity but was coincident with a special factor (Table III), such as meals (9.7%), excitement (5.7%), operation (6.5%), infection (4.4%), diabetic ketosis (4 cases), an injection of insulin (2 cases) or of typhoid vaccine (1 case). In two attacks the onset was associated with trauma. It is noteworthy that an attack occurred during or after a very small meal as well as a large one. Under excitement were such factors as card playing, an argument, fright, worry, and coitus.

TABLE IV.

OCCUPATIONS IN 1100 CASES OF CORONARY ARTERY OCCLUSION

Occupation	No.	Pct.
1. Workers and laborers	402	35.6%
Garment workers 138 (including tailors, cutters, operators, pressers, etc.); unskilled laborers 27; peddlers 24; painters 23; butchers 14; bakers 18; waiters 12; chauffeurs and truck drivers 11; carpenters 12; janitors and porters 10; servants 9; printers 9; laundry workers 7; elevator operators 7; shipping clerks 6; iron workers 9; shoemakers 4; cooks 4; watchmakers 4; upholsterers 4; garage workers 4; plumbers 3; cab drivers 3; orderlies 2; sailors 1; miscellaneous 37.		
2. Store workers	61	5.5%
Grocers 9; jewelers 9; restaurant keepers 8; stationery store 8; delicatessen store 2; fruit store 2; cigar store 2; miscellaneous 21.		
3. White collar and office workers	94	8.5%
Salesmen 57; clerks 15; accountants 7; draftsmen 2; supervisors 2; social workers 1; investigators 1; miscellaneous 9.		
4. Business men	122	11.1%
Manufacturers 33; merchants 31; managers 14; executives 13; agents 13; bankers 7; brokers 6; jobbers 2, miscellaneous 3.		
5. Professional class	94	8.5%
Physicians 29; teachers 11; lawyers 11; engineers 8; pharmacists 7; nurses 5; writers 3; rabbis 2; designers 2; miscellaneous 16.		
6. Housewives	224	20.4%
7. None or retired	103	9.4%

We investigated the time of day when coronary occlusion began, because of its possible relation to effort.

It was found in 767 cases that the incidence of attacks was about the same during the morning, afternoon, evening or night. Dividing the 24 hours into four periods of six hours, beginning at 7 A.M., the percentage of attacks in each varied only from 23.5% to 26.1%. Considering each hour of the day individually, it was found that the number of attacks occurring at 2 A.M. and 10 P.M. exceeded to a moderate extent that at any other hour; otherwise the range was not great.

If effort or emotion were a factor in coronary artery occlusion, one might expect the latter to occur most frequently in some particular stratum of society. However, all types of occupation are included in our series (Table IV). There were unskilled laborers and factory workers, peddlers, pressers, painters, clerks, brokers, salesmen, bankers, teachers, lawyers, physicians; the majority of women were housewives. In Table V the occupational distribution in our series and that of

TABLE V.

OCCUPATION IN CORONARY ARTERY OCCLUSION COMPARED TO GENERAL POPULATION

	Coronary Occlusion	U.S. Census N.Y.C. 1930
All Occupations	772	3,187,459
A. Workers and laborers	402 (52%)	1,766,458 (55%)
B. Store, office, business men	277 (36%)	1,169,713 (37%)
C. Professional workers	94 (12%)	251,178 (8%)

employed persons in the general population of New York City are compared. Excluding housewives and retired persons, our cases were divided into three groups: (A) skilled and unskilled laborers; (B) store and office workers and business men; (C) the professional group. It is seen that the incidence of each group is approximately the same in our series as in the general population. Coronary occlusion occurs irrespective of class and occupation.

Discussion

IT IS obvious that in this large series of attacks of coronary artery occlusion only 2% were associated with severe exertion. The remaining 98% occurred while the patient was asleep or at rest, or engaged in some routine, mild or moderate activity. The association of those with the attack was coincidental, since the percentage of attacks occurring in each of the circumstances mention coincided with the percentage of the day so spent by most people. For example, almost one-third of the attacks began during rest, excluding sleep, and about one-third of the day is usually spent at rest.

The same reasoning may be applied to the 20 attacks occurring during severe exertion, which formed only 2% of the total series. One does not spend a definite portion of the day in unusual effort, but certainly everyone, except an invalid, exerts himself fairly strenuously a number of times daily. Even the patient with severe coronary artery disease cannot help doing so. If effort could precipitate coronary occlusion, the latter should occur with far greater frequency than it does. Indeed, every strain would be fraught with danger, a condition which does not exist. The same holds for excitement, which occurred in only 5% of attacks. The association of effort with the onset of coronary occlusion in rare cases must, therefore, be coincidental. It is noteworthy that those[2,10] who claim that in certain instances effort may induce a coronary occlusion cite only individual cases, frequently involving a compensation claim. They do not give the relative frequency of their cases presumably related to effort among all their cases of coronary artery occlusion. We believe the incidence is no greater than the 2% in our series.

It is probable that the process of formation of a coronary occlusion extends over a period of time, possibly days.[1,8,11,12] This interval may be asymptomatic or may be indicated by premonitory symptoms, which were present in our series in almost half the patients in whom a minute history could be obtained. By eliciting the presence of such premonitory symptoms we have been able to prove in case after case of occlusion presumably induced by exertion that the occlusion had formed prior to the alleged effort. Some of the cases cited by others[2] were observed several months after the occlusion, when a detailed history of symptoms prior to the effort could not be obtained.

Once the occlusion has been initiated it is possible that exertion may produce pain because of the increase in cardiac work. We believe that this sequence of events accounts for the occasional case of coronary occlusion actually associated with effort. The latter does not precipitate the occlusion, which had already been forming, but causes pain. The same is true of effort after the occlusion has occurred.

Further evidence that coronary artery occlusion is independent of external factors, especially effort, is furnished by the fact that the time of day and occupation did not influence the occurrence of coronary artery occlusion. It is also significant that we have encountered 60 patients in whom the attack occurred while they were bedridden, sometimes for many months, with a chronic illness, such as carcinoma, heart failure, etc. In such patients exertion is entirely wanting.

Those who attribute to effort a role in the precipitation of coronary artery occlusion have supported this view on theoretical grounds. On the basis of recent pathological observations by Paterson[1,13] and others[14,15] that intimal hemorrhage into an atherosclerotic plaque is often the initial process in the formation of a thrombus in a coronary artery, it has been assumed that effort and excitement, by raising the blood pressure, distend and rupture the intimal capillaries and produce intimal hemorrhage. Such a view is without proof and, in fact, is probably incorrect, for Winternitz[14] injected dye into arteriosclerotic coronary arteries at pressures up to 1000 mm. without producing rupture of the intimal capillaries. The latter do not arise directly from the lumen of the coronary vessel, but probably from the vasa vasorum of the adventitia. Intimal hemorrhage is entirely a degenerative process, occurring at the site of the severest atherosclerosis. It was present as frequently in patients who had long been bedridden prior to their attack as in the active group.

Trauma may produce severe myocardial changes but these usually differ clinically and electrocardiographically from coronary artery occlusion, with which we are concerned in this paper. In our series only two attacks were associated with some form of trauma; one occurred while the patient was recuperating, several days after a blow over the eyes. We have excluded two cases claiming compensation; one patient had suffered a blow in the chest, the other had sustained a fall. In any case the trifling incidence of trauma in our series rules it out as an etiological agent in classical coronary artery occlusion.

In the course of our studies of the precipitating factors of coronary occlusion in the past eight years we have observed an attack after operation 63 times.[16] In many of these cases the presence of an occlusion was confirmed at necropsy. It is possible that in some of these a relationship existed between the operation and the formation of the occlusion, for the attack occurred, as a rule, within three days after the operation in patients over 50 years of age with considerable coronary sclerosis. This problem requires further study before a final conclusion can be reached. We are,

at present, further investigating it in great detail.

Summary

THE events associated with the onset of 1500 attacks of classical coronary artery occlusion have been studied.

Half the attacks occurred during sleep or at rest, and one-third during mild ordinary activity or walking. In 9% the patient was engaged in moderate activity. Considering these percentages in relation to the portion of the day commonly spent in these activities, it was concluded that they were not causally related to the onset of the attack.

Only 2% of attacks occurred in relation to strenuous effort.

Similarly, meals, excitement, trauma, occupation and the time of day were not significant in the precipitation of the attack.

The conclusion that effort and emotion do not induce coronary occlusion is confirmed by the events during the days and weeks prior to the occlusion.

The attack occurred in 60 patients who had been bedridden for weeks or months.

Intimal hemorrhage, which is the commonest mode of onset of coronary occlusion, is part of the atherosclerotic process and is probably unrelated to external factors.

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The Relation of Trauma to Disease

—*and its Compensability*—

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THE selection of this subject for discussion has been provoked by many queer and often weird opinions encountered in the medical administration of Workmen's Compensation.* Any conclusion, because of the very nature of thought, will be controversial, if we are to derive any benefit through an analysis of the present situation. Opinions concerning causes and effects are influenced by one's mental attitude toward social surroundings as well as the value of one's medical knowledge. The medical profession should be able to agree upon some fundamental facts that are known to and accepted by all.

Doctors are not lawyers, and a legal training fails to teach lawyers more than a smattering of medicine. Physicians deal with theories, interpretations and opinions, while lawyers use, they say, facts. The legal profession seems to regard medical opinion as proof even when unsupported by scientific data. These two professional ideologies differ so greatly that it is hard to determine the merits of many cases, especially when they are confused by divergent medical opinions. The legal mind turns backward to precedent, using past court opinions. These are liable to perpetuate the mistakes of the past and project them into the future. Legal methods of correction are through new laws and the reversals of previous court decisions. On the other hand, the medical profession slowly parts with its conception of etiologies, and usually through the results of research, turns its face toward the future in search of a new beneficial discovery. Mankind's insatiable desire to understand the mysterious is inherent in medical men and drives them on into research for an understanding of the cause of disease. Patients too, must have their curiosity satisfied, and they contribute their histories colored with their own interpretations of events leading up to the present illness. In dealing with claimants one must subject their histories to scrutiny. Dr. Munro, of Boston, said this concerning a patient's history: "He (the physician)should never accept the patient's own story without such confirmation as is obtainable from a description of (or lack of description of) the period immediately preceding and following the accident as well as the accident itself."

Time was when causal etiology had no particular value other than a statistical one. Now every industrial traumatic case has an economic value. Today every injury and the occupational diseases immediately have a legal status, and the courts discuss medical opinions and attempt to determine

* Read at the Twenty-Fourth Annual Meeting of the American Association of Industrial Physicians and Surgeons, Cleveland, June 5, 1939.

through them the merits of the claim. How important our opinions are can be judged by this quotation from an actuarial report by Woodward and Fondiller: "In at least 80% of both compensable and non-compensable claims the disposition thereof depends upon medical opinion." What a huge responsibility the medical profession in Ohio must assume when the figures show that in 1937 $11,444,738 was paid out in compensation alone. The question of the legality of the trauma may be determined by law, but the relationship of the sequelae to the injury is largely dictated by physicians. I have a feeling, as does DR. KESSLER, that the profession is poorly prepared by training to understand our relationship to the adjudication of claims. When the courts decided that industry only employed well people, unless otherwise proved, the principle of compensability for the aggravation of a pre-existing malady, or the activation of a dormant disease, added to the confusion already existent in medical minds. Expert medical opinions were so confusing to the lawyers, physicians and commissioners because of their differences, that finally the truth had often to be settled by those least competent to judge, the lay jury. We in Ohio are going to try to obviate some of these difficulties by an experiment new to us but not new to some of the other States. Our new law on occupational diseases creates a Board of Medical Referees who, as the law reads, shall, when a claimant is not satisfied with an order of the Industrial Commission, hear and pass upon the medical questions involved in his claim; and if a majority of such board shall find in favor of the claimant on medical questions, such finding shall be binding upon the Commission. It is my hope that such a medical board may be found legally satisfactory, and that this principle can later be enacted into law that will apply to all phases of the adjudication of personal injury claims and their sequelae.

ETIOLOGY as applied to trauma seems in too many instances to rest upon the individual opinion of the physician giving it. One finds it hard to adapt many causes well recognized from a medical standpoint and accepted generally by the profession with those that may be classed as medicolegal. The latter are apt to exhibit an entirely new complexion. MOREHEAD and WAINWRIGHT have stuck to the medical etiology of hernia; and, therefore, fail to assign trauma as a cause except in those cases exhibiting evidences of injured tissue, apparent to all, in the inguinal region, and their accompanying constitutional reaction. A true traumatic hernia, medically speaking, is rare, yet in Ohio some 3000 are legally recognized yearly. A medical man can hardly believe in the court's conception of the etiology of a traumatic hernia. You may blame this situation, and many other similar ones, upon the lawyers and the courts, but you must not forget that testimony given the courts by physicians has taught them their viewpoint. We, who are presumably the custodians of medical knowledge, are duty bound in the interests of society and ourselves, to abide by the spirit of the words of BRAHDY and KAHN in their closing remarks upon "Trauma and Neurosyphilis: The medical expert has a distinct duty to keep within the limits of what is reasonable and must not allow his imagination to run riot and give the dignity of probability to conclusions that may only be considered as remotely possible." How often have I read the transcript which clearly indicates that the expert was not sticking to known and accepted medical truisms! I cannot refrain at this point from giving you the medical expert opinion of two witnesses for the plaintiff, in the same case:

No. 1—A country physician.

Q. "What is meant by posterolateral sclerosis?"

A. "Postero means back. Lateral means to the side. Sclerosis means 'in by the bone,' disease of the bone."

Q. "I didn't get that." A. "Sclerosis means disease of the bone."

No. 2—An industrial physician for a large company.

Q. "What is meant by the expression 'posterolateral sclerosis?' "

A. "Well, the posterior, the patient is assumed to be lying flat. Where we get those positions we take them from the cadaver on the dissecting table. He is supposed to lie on his back. Anterior is anterior and the posterior is an inflammatory condition of the posterior portion of the lateral vertebrae."

Q. "And what is the common cause of that?"

A. "Inflammation and injury."

Absurd, yes, but it has happened and equally as bad is going on daily somewhere.

Traumatic etiologies have not been subjected to the close examinations that we demand of our research workers in other fields. I wonder if many of the opinions on this subject in our literature would stand up under a searching scientific study. Many have never been subjected to proof, but copied from previously expressed opinions of writers before the days of research. Many have been statistically arrived at through the acceptance of lay opinion as given in case histories. Some do not even agree with the best modern medical thought. Some are but the opinion of an expert harassed by legal badgering and given without thoughtful consideration. No wonder this condition predisposes our profession and its opinions to ridicule and distrust. Coincidental happenings, as recorded by our patients, are not a reliable yardstick for measuring and evaluating cause and effect.

MAY I direct your attention to what I believe is a fallacious reasoning concerning the aggravation of constitutional syphilis? Is it not true that syphilis is a constitutional disease, even before the chancre apears? The spirochaeta has already invaded the body, and why it elects to attack muscles, bones, nervous tissue, etc., is un-

explainable, unless the organism is made up of different families, or people have different protective mechanisms or weaknesses inherent in special tissues. It is my feeling that trauma only determines in some cases the new location of the next appearance of the disease. What a vast difference there is between the reasoning of the orthopedist and the neurologist. The orthopedist no longer thinks that the delayed union or ununited fracture is caused by a complicating syphilis. He does not consider a luetic bone lesion a contraindication for bone surgery. The neurologists on the other hand seem to believe that any injury to the head can activate a general paresis, provided its appearance does not occur in too short a time, or after too long an interval. Just what causes them to ignore the normal progression of the disease and its expected habits, I do not know. Some physicians go so far as to testify that an injury, such as a fractured leg which promptly united, was the cause of a general paresis appearing four years later, though the claimant had worked two and a half of the four years at his usual occupation. This person was known to have had an untreated syphilis prior to his injury, and the testimony given was that the pre-existing constitutional syphilis was aggravated.

DR. LOUIS ROTH, of Columbus, is now attempting to study syphilis and its relationship to injury. He informs me that so far he and his colleagues have studied and followed up 125 cases of injury, 50 of whom had positive serology and 75 who did not. He failed to observe evidence of the syphilitic process being activated by injury. There was no evidence of gumma in the skin, periosteum or bone, as evidenced by x-ray or pathology. The positive cases in point of time healed approximately as quickly as those that were negative. Syphilitic cases, in comparison with non-syphilitic cases, remained in the hospital because of their injury, about the same number of days. While this is a preliminary report, and the cases few, yet DR. ROTH feels that in these cases he cannot find that injury either aggravated a constitutional syphilis or activated it, and really did not delay the process of healing nor produce other local manifestations of the disease. In these cases studied, many were fractures, a good percentage of which were of the skull and the bones of the face.

I AM interested in the subject of malignancy, its aggravation and activation. Lately there seems to be a veering away from the conception that a single trauma activates or aggravates carcinomatous tissue. This same conclusion is not yet accepted for sarcoma. The literature seems to be bearing toward constant irritation, rather than the single blow. DR. H. T. KARSNER, Director of Pathology at the University Hospitals in Cleveland, discussed the subject in a "Review of the present status of the etiology of cancer," November 17, 1937.[1] The article is well worth reading. He burned his bridges behind him when he declared against some past conceptions concerning the etiology of cancer, and wrote: "The most widely accepted view about the activity of a single traumatic injury is to the effect that this does not produce the conditions necessary for the development of tumor. In patients late in the course of the disease it may be pre-supposed that tumor cells are found frequently in the circulation, and if this be true, it is at least conceivable that injury may determine the site of metastatic growth, but the trauma does not cause that metastasis. There is no reason, on the basis of either human or experimental observation, to believe that trauma causes or accelerates tumor growth." I interpret the same leaning in the writings of DR. JAMES EWING, an international authority upon cancer, though he does not speak as positively. Let me cite a recent case at hand:

A white male, age 35, on February 17, 1938, allegedly injured his left testicle, which was described by his physician as "swelling, redness, and tenderness." The diagnosis made was "traumatic epididymitis" and the usual treatment was given. He was discharged as cured, March 10, 1938, and returned to work. On March 8, 1939, he was laid off because of slack work, not disability. On March 16, 1939, while in bed, he experienced severe abdominal and testicular pain. The physician called, noted patient's left testicle was hard and enlarged, and felt a hard mass, the size of a baseball in the left upper abdomen. The testicle was removed and the pathological examination showed an embryonal carcinoma. Legally this would be a sound claim, if judged by laymen. Is it medically?

THE courts do not always agree with the opinions of the psychiatrists, a group of specialists with whom I often find it hard to agree. In fact, it seems to be difficult at times for them to understand themselves. The Michigan Supreme Court gave, to my way of thinking, a very sensible etiological analysis in the case of a man who had his foot run over, without fracture, and whose physician thought him able to work. This he did not do, and later developed "bad mental conditions," a condition which goes in Ohio by the name of psychoneurosis, conversion hysteria, neurosis, et al. He developed ideas of persecution, killed a man six years later, and finally arrived in the asylum for the criminal insane. An award was made to him by the Compensation Board, and the dissatisfied employer appealed to the Supreme Court. Said the Court in brief: "The workman had become worse. The question is whether and when disability arising from a mental disorder growing out of an accident is compensable."[2] The Court further said: "The authorities plainly indicate that where an accident has a direct effect on the nervous system, all the results thereof, both physical and mental, go to make up disability and

1. Condensed in *The Clinical Bulletin of the University Hospitals of Cleveland*, January, 1938.

2. *J.A.M.A.*, 110:10, 765; *Schneyder v. Cadillac Motor Car Co.*

determine compensability. When, however, the mental disturbance is collateral to the injury and is due to worry, anxiety and brooding over the accident or its effect on compensation for it, *it is not compensable.*"

SINCE DR. CARL BECK wrote about "The Heart a Surgical Organ" and DRS. BRIGHT and BECK discussed "Non-Penetrating Wounds of the Heart" and KISSANE, FIDLER and KOON'S "Electrocardiographic Reports Following Exteral Injuries to Dogs," DR. ERNEST P. BOAS has reviewed the literature to prove that angina pectoris can be initiated and aggravated by trauma of the non-penetrating variety. He too states that severe and unusual bodily effort may initiate it. Here is the entrance of trauma as an etiological factor in functional and organic heart derangements. Some conservative authorities have denied the influence of trauma upon heart disease, notably MASTER, but the present enthusiasts, particularly the cardiologists, seem to me to be concluding beyond their proof. Penetrating wounds of the heart and their etiology are usually too apparent for discussion. Certain specific criteria must be accepted before trauma can be designated as an etiological factor in the causation of heart pathology:

1. A history of specific injury accurately investigated and authenticated.
2. Immediate onset of recognizable symptoms by the expert.
3. Failure of the condition to fall into other classifications etiologically.

My colleague, DR. M. B. RUSOFF, says: "Acute cardiac dilatation is no longer in good favor, especially that following a sudden severe strain. In the absence of heart disease, the aortic valve closes at the beginning of the diastole, the only phase in the cardiac cycle when the myocardium is unable to repel any sudden severe force transmitted by the blood stream. Aortic valves have ruptured from sudden influx of blood flow under markedly elevated blood pressures. Here the symptoms are immediate and antecedent disease is present. The mitral valve can also be ruptured when a pathological heart exists.

"Coronary occlusion and angina pectoris have been lately attributed to strain. It is hard to believe, when this occurs, that previous coronary disease was not already in existence. The very etiology of coronary disease is one of slow progression, so that a strain did not produce it, but called attention to it. It is doubtful if the course of a coronary disease is ever altered, except when infarction follows the strain.

"The term 'myocardial contusion' bears close scrutiny. The chest and its contents are quite resilient and do not readily evidence effects of trauma. But where there is a crushing blow to the precordium, one cannot deny the possibility of myocardial contusion. The symptoms here must evidence themselves immediately. They are usually in the form of some conduction mechanism defect. This is easily discernible on electrocardiography, and almost invariably transient, usually disappearing completely in a very short time. Never is there an appreciable interval between the injury and the signs and symptoms. Cardiac disability of this type is rarely protracted, and even more rarely is there any alteration in the cardiac life of the individual. The anterior descending branch of the left coronary artery may be ruptured, but this is demonstrable grossly at necropsy and does not require microscopic sections.

"While we are still discussing myocardial changes, let us not neglect to mention a frequent problem we encounter when an elderly individual has had a localized ulcer or infection, which has failed to cause more than a localized lymphadenitis. The contention is frequently made that a myocarditis is the end result. This is fallacious, as is apparent to any student of cardiology. These individuals possess a myocardial fibrosis, which is the natural concomitant of their senescence and coronary sclerosis. They at no time evidence endocardial changes, nor do they ever reveal any inflammatory involvement of the myocardium."

I will offer no conclusions, as is usually done. You can readily see that my idea in discussing this subject was formulated in the hope that we would stop, look and listen before we proceed further. It is my plea that we should be firm and accurate in our opinions and that only opinions recognized and proved to be the best should be given. It will be to our own shame, if we wake up and find out some day that because of our medicolegal opinions, we have created two standards of thought, the one dictated by the best of modern medical knowledge, and the other by legal expediency.

Discussion:

DR. C. O. SAPPINGTON, Chicago: DR. MCCURDY has given you, I think, a very excellent speech on this subject. It is a particularly hard one to discuss in a short time, and for that reason I shall just indicate some of the phases I think may be difficult.

In the first place, there is apparently great difficulty in using clear and logical reasoning in reference to the establishment of definite causes and relationships in all these types of cases. Merely because a certain event has taken place does not necessarily mean that a certain result always follows that event and has direct relationship to it or, rather, that the result is a direct effect of the cause to which the effect has been assigned. I always remember what old Professor Whipple used to say at Harvard University when he taught vital statistics. He was able to demonstrate a high mathematical correlation between the softness of asphalt pavement in the summer time and the infant mortality rate during the summer time. Of course, there was no direct relationship at all. There was another fact which entered into that which was directly responsible for the higher mortality during the summer, and that was the high temperature and not the consistency of the asphalt which was the result of the high temperature itself.

Another thing which I think is going to be quite difficult for us in distinguishing between injuries and disease is that there is not any clear distinction between injuries and disease. If you take the trouble to look it up you will find that in some places blisters and abrasions are called diseases whereas most medical men, I think, would interpret them as injuries. You will also find carbon monoxide gas being interpreted as an injury, where we

have always been taught it was really a disease. That is the conflict between scientific interpretation of these conditions and a legal interpretation, which I think will always bring us into trouble, at least during our generation.

It may interest you that recently in Illinois we had a case before the Commission in which it was alleged that tuberculosis occurred not as a disease but as an injury. The disease itself! It was not argued that the disease was aggravated; it was argued that the disease itself was an injury, and that an injury took place because of the breathing of certain vapors which caused the employee to cough and thereby have hemorrhage.

The increasing tendency for the use of medical men on referee boards is heartening. Certainly, to get any place in the adjudication of the technical aspects of these cases, we must use people who are properly trained.

More and more we are going to be called upon to use differential diagnosis and its relationship to the differentials between actual occupational diseases and diseases of ordinary life to which the general population is exposed without any respect to employment.

DR. WALTER STERN, Cleveland: Our local Will Rogers, Pete Whitton by name, says that an expert is a damned fool far away from home and who couldn't be found out.

In Ohio the compensation boards of every kind are bound by law and by court decisions which, as DR. MCCURDY has already told you, are influenced in great measure by medical testimony. The United States Bureau of Labor has issued a bulletin within the last year comparing the justice of the awards in the States that allow no review of the industrial boards' findings by courts, and there are quite a number of such States, and what happens in States like Ohio where an appeal can be made from the verdict of our industrial commission to the courts. I think for those of you who have not seen this bulletin the conclusions arrived at would be rather startling. We might all of us admit that there are certain constitutional diseases and certain diseases which may be initiated or aggravated or activated by trauma, but, as already expressed, the trauma must be absolutely definite, and if we are dealing with a so-called malignancy the trauma must be directly over the spot that has been subject to malignancy. Then the process must come on within a logical and reasonable length of time.

DR. MCCURDY has already told you what a reasonable length of time would be in pulmonary tuberculosis and what the courts would say was a reasonable length of time in neurosyphilis.

I was very much interested in looking up my statistics not so long ago as to whether one single trauma could cause a bone sarcoma. I was led to that by certain cases appearing in my practice that went on to adjudication, and I thought I had several cases. However, when the cases came to their final conclusion I found in each and every one of them that it was not a case of primary bone sarcoma at all, but was a secondary bone sarcoma caused by origin in another organ. My own opinion is that I cannot see how an ordinary injury, one ordinary injury, can cause a definite bone sarcoma.

DR. MCCURDY has already expressed himself on the fact that certain of our authors have loosely taken the word of their patient. In one very well known book on bone malignancy, bone sarcoma, DeSchecter's, practically every one of the cases spoke of an injury. DeSchecter's book is filled with injury, injury, injury and injury. But if you get hold of DeSchecter giving an address on this subject before a medical society and pin him down to his personal opinion as to whether or not trauma, one direct trauma, is the cause of bone malignancy, Dr. De Schecter will say no.

So I believe it is up to such men to revise their books so that the error appearing in them will not be transmitted to others. You still can find books which will tell you that injury is the cause of infantile paralysis. Of course, that goes back to the days when we had no knowledge of the logical cause of infantile paralysis whatsoever.

DR. HENRY H. KESSLER: It was indeed a delight to hear DR. MCCURDY. I think it was James Whitney Hall who once referred to medical jurisprudence as court house medicine. He was once asked on the stand to describe the various types of epilepsy. He said: "Well, there is petit mal; there is grand mal; there is static epilepsy, there is litigation epilepsy, and the most common type of all is court house epilepsy. You won't find it in the books, but you will find it here."

Years ago when I first came from the New Jersey Department and was faced with problems, I too was embarrassed and overwhelmed by these unusual situations which I had never studied in medicine. They truly belong to a different category of medicine, court house medicine. And I sat down and tried to assort a great deal of personal information which I had gleaned from my daily practice, my daily work with the New Jersey Compensation Bureau and as investigator of the foreign office, and I compiled a book which I called, "Accidental Injuries."

Now there has been such an increasing trend in attributing to disease all sorts of traumatically logical factors that I think I am going to revise my book and call it "Incidental Injuries," because I think it would be a more appropriate subject.

From my own experience it is my conviction that trauma plays a very small role either in etiology or aggravation of disease, with the exception of infection processes. I see it grow less and less.

But outside of neurosyphilis and all the other conditions which come before us in the prosecution of these claims, I find that the courts are dependent on hangers-on of the court to make the diagnosis for the judge, and the doctor is left as sort of an appendage to the whole general scheme of things.

What is the cure? I am not one, either, to offer a solution, but I am an optimist, because, as great as these abuses are, nevertheless good work is being done. It is being done because of administrative changes.

Just look at Ontario's system. A long time ago I objected to the idea of a man sitting in a swivel chair and looking over some reports submitted by physicians and attempting to evaluate the medicolegal phases or factors in a case without actually seeing the case and without having the opportunity to hear the doctors who participated in it. But I have changed my opinion. I think great justice, if not better and greater justice, can be done by a properly trained and qualified individual sitting behind a desk and reviewing a report. I have a high regard for that Ontario system.

From the Archives

THE search for the earliest mention, in recorded history, of the employment of an *industrial* physician finds one, thus far, who was almost a contemporary of Ramazzini:

"Volume IV of the Transactions of the Newcomen Society contains an account of the Works Organization of Ambrose and John Crowley. This firm of hardware manufacturers was doing business as early as 1682 and the works continued until sold out in 1863. . . . Industrial welfare is represented by a pension plan for old employees and for the employment (1724) of a company physician . . . 'one well skilled in Physick—one that's of a sober life and conversation and not so much addicted to pleasures as to be withdrawn from a due attendance on his business'."*

* From "Laws of Management Applied to Manufacturing," by L. P. ALFORD, Ronald Press, New York, pp. 40-42.

Treatment of Hernia

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AS MY excuse for bringing to your attention this time-honored subject I will plead that, to the industrial surgeon, no subject is of more importance.* It would seem, also, to be of value to discuss at this time some of the recent trends in the treatment of this very common condition. When we stop to consider the frequency of hernia among workers in our industries, we are struck by the fact that, of all the causes of rejection for employment, as well as the reasons for temporary disability of those employed, hernia is found to be well in the forefront. The importance, therefore, of repairing this condition and thus restoring these workers to useful productive activity, becomes at once apparent. For this reason this Association and its affiliated bodies must be, and are, interested in the treatment of hernia.

As I intend to discuss only the treatment of hernia, I shall omit consideration of etiology and pathology. Anent the indications for treatment I shall say only that when a hernia is first discovered by the patient or diagnosed by the doctor, the indication for treatment is at hand and some therapeutic disposal of the case must be made at once.

I shall, therefore, discuss the treatment of hernia under three headings:

1. Truss,
2. Operation, and
3. Injection.

Truss Treatment

TRUSS treatment may be undertaken to produce a cure or it may be adopted as a palliative measure. In infancy the wearing of a truss, from the earliest day of discovery of hernia, constantly for a period of six or seven years will, in most cases, result in a cure. However, occasionally a case will be seen that gave this very history in infancy and early life and yet later on in young adult life a hernia developed—so that this proceedure is by no means a cure-all. For palliative treatment a truss may be advisable in those patients who are beyond what is considered to be the safe operative period—in those patients whose habits of life and occupations are such that no unusual muscular effort is ever called for—or in those patients whose general condition, particularly the condition of the heart, blood vessels, kidneys and respiratory system, is such as to render it inadvisable to administer any form of anaesthetic, even local. Lastly, the truss may be worn by that class of patients intermediate in age between these two, where, from an economic standpoint, the loss of six to eight weeks in time would be economically disastrous. These cases should always be considered as potential operative cases, simply awaiting the proper opportunity. Then, of course, there are a certain number of patients who absolutely refuse to listen to operative proposals, and something must be done to relieve them.

There are certain absolute contra-indications to the wearing of a truss:

1. Irreducibility—here the application of a truss is unthinkable.
2. Hernia associated with undescended testis—here the truss delays or rather prohibits the possibility of any further descent of the testis and may cause undesirable pressure on the testis itself.
3. Cases in which the hernia cannot be retained by a truss at all times—here the inadequacy of a truss may lead to real danger.

Even in properly selected cases there are important objections to the truss treatment:

1. The discomfort and the interference with the patient's normal activities.
2. The necessity for larger, heavier and more elaborate trusses as time goes on.
3. Finally, and most important, in many instances the wearing of a truss causes a patient to put off an operation at a time when a cure is most apt to be permanent. At a later time, when conditions have changed, the patient is willing to be operated on, but the hernia has increased so much in size and the patient's general condition has changed so much for the worse and even the truss has so lost its ability to properly control the hernia, that the outlook for a permanent cure is less bright than previously.

It must also be remembered that occasionally we may see a patient who is wearing a truss after the hernia has passed into a condition of incarceration or even strangulation. Here the truss must be at once discarded and an operation performed.

In dismissing the question of truss treatment, it may be safely said that with the exception of a certain small percentage of indirect inguinal hernias in infants, the wearing of a truss almost never produces a lasting cure.

Operative Treatment

WE COME now to the operative method. In discussing this method of treatment I shall consider first the less frequent types of hernia: umbilical, ventral, femoral, hernia with undescended testis, and internal hernias.

The umbilical and ventral hernias successfully resisted cure, in most cases, until surgeons—particularly Mayo[1] and Blake[2]—advocated the overlapping of the aponeurosis of the anterior abdominal wall. In the Mayo method the transverse overlapping for an umbilical hernia, and in the Blake method the vertical overlapping for a ventral hernia, have shown a much larger percentage of cures than was obtained by earlier methods. Large hernias of this type, however, often yield disappointing results, owing principally to excessive tension. Where these hernias occur in the lower half of the abdominal wall, the pedicle fascial transplant, as advocated by Wangensteen,[3] has

* Read at the Twenty-Fourth Annual Meeting of the American Association of Industrial Physicians and Surgeons, Cleveland, June 8, 1939.

given very happy results in many cases. But this, too, is not without its failures. In the epigastric hernia—which is merely a ventral hernia in the midline above the umbilicus—it is important, whenever possible, to approximate, by separate suture, the inner borders of the recti.

The cure of femoral hernia is often most difficult. The time-honored method of approximating the pectineus fascia to Poupart's ligament by a mattress suture, after high ligation of the sac, has given satisfactory results in most cases, but this is due more to the high ligation than to the suture. It is, of course, impossible to completely close the femoral ring without danger of too great pressure on the femoral vein. The so-called "high operation" — advocated by Moschcowitz[4] — is of great service in many cases, particularly those with a large ring and a large sac. In this operation the transversalis fascia along the floor of the inguinal canal is incised, and, without opening the peritoneum, the sac is pulled up through the femoral ring and may be opened and the contents disposed of as the condition may require, or may not be opened at all. It may be ligated at its neck or it may be inverted and the inversion maintained by a suture. Poupart's ligament is then sutured down to Cooper's ligament by two or three interrupted sutures, and usually a good closure of the ring is effected. The inner leaf of the external oblique, the internal oblique and the transversalis are then sutured to Poupart's over these previous sutures. It has seemed to us that incising the inner border of the internal oblique and transversalis *muscles*, instead of the transversalis fascia in the floor of the inguinal canal, would afford a better safeguard against the future development of a direct hernia. If this is done it is not necessary to include the inner leaf of the external oblique in the subsequent suture of the internal oblique and transversalis to Poupart's ligament.

TABLE 1.
314 CONSECUTIVE FEMORAL HERNIAS AT THE HOSPITAL FOR THE RUPTURED AND CRIPPLED

Suture Material	Number of Cases	Deaths	Infections No.	Infections %	Followed 1-9 years and well	Recurrences of followed cases No.	Recurrences of followed cases %
Silk	30	0	1	3.3	20	2	9.1
Catgut	260	3	7	2.7	60	4	6.2
Gallie	24	2	4	16.6	13	5	27.7
Total	314	5	12	3.8	93	11	10.5

Hernia with undecended testis, while not often seen in adults and therefore not particularly germane to this discussion, cannot be entirely ignored. Seen usually in infancy, it is best treated by watchful waiting until the child reaches the age of seven or eight. No truss should be worn but the progress should be carefully watched, lest a sudden increase in size of the hernia be neglected. The operation as devised by Torek[5] has given the most satisfactory results in our hands.

The author has purposely omitted from this discussion all consideration of those very rare forms of hernia known as "internal hernia," the reason being that, like the majority of surgeons, his experience has not been sufficient for him to outline and recommend any particular technique. It would seem that, in the management of these cases, close adherence to fundamental surgical principles would suffice.

We come now to the treatment of inguinal hernia.

Inguinal Hernia

SINCE the time when, in 1885, Bassini[6] described his method for radical cure of inguinal hernia before the Italian Surgical Society, surgeons all over the world have more or less universally adopted his technique. As time passed various surgeons introduced modifications of Bassini's original operation. Some of these have stood the test of time; others have succumbed to the cold analysis of end results, and have been discarded. However, Bassini's operation is still basically the method of choice for the cure of inguinal hernia.

In a search for a more effective method, in certain cases, there has been a tendency to approach the problem with an analysis of the actual lesion to be repaired, and to attempt to devise a method of repair for this particular type of case, rather than to follow custom blindly and employ the exact Bassini technique. This is well illustrated in the treatment of direct hernia. Bassini himself stressed the importance of the transversalis fascia—not only because its weakness was considered a causative factor in the production of hernia but also because of the advantage gained by its employment in a separate layer of sutures as a strengthening factor in the cure. Since his time we have gone a step further and we believe that in the attempted cure of a direct hernia it is advisable to mobilize this entire layer, from the internal ring, downward, as a separate layer to be sutured first and independently to Poupart's ligament. This procedure is not as difficult as might be supposed and, when effectively carried out, provides a strong floor for the inguinal canal where it is weakest, without attenuating the strength of adjacent structures.

This step has gone a long way toward reducing the incidence of recurrence in this type of case.

Suture Material

THROUGH the years there have been many changes of mind as to the choice of suture material. In early days non-absorbable sutures were thought to be necessary in the cure of hernia. The use of catgut, either plain or chromosized, and of kangaroo tendon, followed this period and for many years this type of suture was very generally employed. Still there were recurrences in cases which did not seem to merit this fate.

About 15 years ago the work of Gallie and LeMessier,[7] of Toronto, in the use of strips of fascia lata as sutures in some cases of orthopedic surgery and in hernia repair, attracted the attention of surgeons, particularly those interested in the problem of hernia. At the Hospital for the Ruptured and Crippled, in 1924, we began to use fascia in those cases which had heretofore resisted cure by the use of chromic catgut and kangaroo tendon. We

used it mainly in three types of cases: (1) Large indirect inguinal, (2) direct inguinal, and (3) recurrent inguinal.

This study was continued for 10 years and the results are contained in a paper by Burdick et al[8] in 1937 and may be epitomized as follows:

Inguinal { Indirect—large—patient past middle life. / Direct. / Recurrent.
Femoral.
Umbilical.
Ventral and Epigastric.

The conclusions reached were:

1. Infections more common.
2. Recurrences still discouragingly frequent.
3. The theory of non absorption was exploded.

INFECTION: The very type of case wherein this suture material was employed would predispose to infection—extensive dissection, much scar tissue in the recurrent cases, and free bleeding. Another factor was undoubtedly the undue handling of the fascial strip before it was finally placed in position as a suture.

RECURRENCE: Undoubtedly the large needle used, making a large hole in the thinned-out tissues, predisposed to recurrence.

In many cases such a degree of tension was necessary to close large defects that probably the suture pulled out of the delicate tissue and thus started the case on the road to recurrence.

THEORY EXPLOSION: In the laboratory it was demonstrated that these sutures remained viable for long periods of time and became eventually incorporated in the host.

This was found not to be true in the human being later operated on for a recurrence. In many of our cases subsequently operated on for a recurrence, not a trace of the fascial suture was found, and in a few cases only an attenuated strip remained lying along the old suture line.

TABLE VIa
RECURRENCES

	No. of Recurrences	In 1485 Cases	In 975 Followed Cases
Before and after 1 year:			
37% recurred in less than 1 year	107	7.2%	10.9%
63% recurred after 1 year	177	11.9%	18.2%
Before and after 2 years:			
60% recurred in less than 2 years	171	11.5%	17.5%
40% recurred after 2 years	113	7.6%	11.6%
Recurred under 1 year	107		
Recurred after 1 year	64		
Recurred after 2 years	30		
Recurred after 3 years	21		
Recurred after 4 years	17		
Recurred after 5 years	14		
Recurred after 6 years	8		
Recurred after 7 years	6		
Recurred after 8 years	8		
Recurred after 9 years	1		
Recurred after 10 years	5		
Recurred after 11 years	3		

TABLE VIb
RECURRENCE RATE BY TYPE OF FASCIA

Autogenous	207/746	27.7%
Homologous	17/60	28.3%
Ox Fascia	60/169	35.5%
Total	284/975	29.1%

RECURRENCE RATE BY TYPE OF HERNIA

Inguinal Indirect Primary	35/202	17.3%
Inguinal Indirect Recurrent	29/108	26.8%
Inguinal Direct Primary	80/310	25.8%
Inguinal Direct Recurrent	63/154	40.8%
Inguinal Indirect and Direct Primary	22/70	31.4%
Inguinal Indirect and Direct Recurrent	5/13	38.4%
Femoral Primary	4/13	30.7%
Femoral Recurrent	1/6	16.6%
Umbilical and Epigastric Primary	11/31	35.4%
Umbilical and Epigastric Recurrent	1/3	33.3%
Ventral Primary	25/55	45.4%
Ventral Recurrent	7/9	77.7%
Lumbar Primary	1/1	100.0%
Total	284/975	29.1%
Inguinal—Indirect—Primary—Autogenous	22/142	15.4%
All Inguinal Primary	137/582	23.5%
All Inguinal Recurrent	97/275	35.2%

In general our infection rate was 8%.

Our recurrence rate was 29%.

In 68% of the cases followed for more than one year, twice as many recurred after the first as during the first year.

Two-thirds as many recurred after the first two years as recurred during the first two years.

Therefore, in 1934, at the Ruptured and Crippled, silk was adopted by many of us as a suture material and thus the pendulum swung back to the days of Halstead. Since our adoption of silk the time elapsed is too short to provide any solid ground for statistical opinion, but our general feeling thus far is one of satisfaction with this suture material. The use of silk demands refined technique, careful handling of the tissues, and absolute hemostasis and is thus a splendid incentive to good surgery. We have found that the finer silk we can use, the better, and there must be no tension, thus replacing strength with brains.

Division of the Cord

IN MANY cases—particularly the large indirect hernias in elderly men and in the recurrent cases—division of the cord is a valuable aid toward securing a successful result. This procedure has been carried out at the Ruptured and Crippled in about 200 cases and the results are very gratifying. Burdick and Higinbotham[9] give as their indications for this step:

1. Recurrent hernias in patients over 50 in whom the opposite testis is normal.
2. Recurrent hernias in younger subjects who are incapacitated from their usual occupations and who have an apparently normal testis on the opposite side.
3. Large scrotal hernias in the aged which are either irreducible or cannot be satisfactorily retained by a truss.
4. Large sliding hernias.

Division and resection of the cord reduces the operating time almost one third—it also permits

two layers of muscle or fascia to be sutured to Poupart's ligament without any intervening tissue and without leaving a weak spot in either layer which, of necessity, exists if the cord is present.

In scrotal hernia it is unwise to disturb the lower end of the sac for fear of damaging the future collateral circulation. After this procedure there is usually considerable swelling, accompanied by redness, of the skin and edema of the scrotum.

Most of the testes atrophy, but it is surprising how many do not. In four cases of this series gangrene occurred and the testis had to be removed in each case.

It is interesting to study the effect of this procedure on wound healing—159 of these 200 cases healed per primam—six were drained at the lower angle at the time of operation and healed in from 10 to 30 days while 33 wounds became infected, in most cases of no serious consequence and responding to adequate drainage. Two cases, however, resulted in fatal peritonitis—one in which the intestine was opened at the time of operation, and one in which the omentum had been ligated in the neck of the sac. The recurrence rate in these cases is also interesting—in the recurrent cases, it is 23%.

In the primary cases it is from 4% in ordinary uncomplicated cases to 7% in cases of sliding hernia—the latter particularly interesting in that it represents the recurrence rate in one of the types of inguinal hernia most resistant to cure.

In closing the discussion of the operative methods it is well to admit that no method guarantees a cure in all cases. By any technique we will always have some recurrences.

Let us examine some of the causes for these recurrences.

They may be divided into:

1. Causes beyond the control of the surgeon, and
2. Causes within his control.

The factors beyond the control of the surgeon are:

A. The age of the patient—the chances of a cure diminishing as the age of the patient increases.

B. The type of hernia—the oblique inguinal being the most likely case for a cure and the recurrent inguinal being the hardest to cure—the postoperative ventral and some umbilicals falling into this latter class.

C. The condition of the patient's muscles and fascia.

D. The occupation of the patient. Naturally hernias in patients having laborious occupations are most likely to develop recurrences.

The factors within the control of the surgeon are:

A. The type of operation selected and the care in its performance.

B. The prevention of postoperative complications such as vomiting, cough and distension.

C. The avoidance of wound infection.

D. The postoperative care—time spent in bed—time allowed for complete convalescence before the patient returns to regular work.

Injection Treatment of Hernia

EVERY so often the question of treating reducible hernias by injection is brought before the profession. This happened many times in the past century and each time, after a more or less prolonged period of enthusiasm, the method has been dropped, as not meeting the requirements. The present wave of enthusiasm started some four or five years ago and it seemed wise to us at the Hospital for the Ruptured and Crippled to give the procedure a fair scientific trial. Accordingly a selected group of cases was chosen, various injection solutions employed, and a careful detailed follow-up inaugurated. One or more examples of each type of reducible hernia was chosen. This work was begun in October, 1934, and continued for about two years. These results were published by Burdick and Coley[10] in 1935. In that study we treated 66 patients with 91 hernias. Of these, 64 patients were males. The age variation was 23 to 84 with an average of about 50.

Injection Treatment of Hernias

	Patients	Hernias	Percentage of Followed Cases
Number treated	66	91	
Not traced or dead	9	16	
Followed	57	75	
Known Failures*	48	63	84.0%
Possible Cures†	4	5	6.6%
Cures‡	5	7	9.3%

*Eleven of these patients were later operated upon.
†No recurrence after 8 to 20 months but still wearing truss.
‡Remaining cured 5 to 20 months after removing truss.

Technique: In brief the technique consists in making injections into the region of the hernial sac on successive visits two or three days apart and the wearing of a truss. The truss is worn day and night for the first six weeks and after that, removed on retiring. During waking hours the truss is to be worn from six months to a year—long after the actual injection treatment has been discontinued. In the case of inguinal hernia the injections are to be started either at the external ring and given successively higher and higher up in the inguinal canal, or they are started at the internal ring and given successively lower and lower down the canal. In either case the needle is to be passed *just* through the external oblique aponeurosis. In cases of hernia of other types, the injections are given around the neck of the sac.

Solutions: All solutions contain some sclerosing chemical, such as tannic acid, gallic acid, alcohol, etc. They bear the names Pina-Mestre; Galtanol; O'Malley; Proliferol; Thuja; Sylnasol.

Number of Injections: Average number 21; highest 36; lowest 4. Forty-six of these cases had Pina-Mestre solution; 14 had Pina-Mestre, O'Malley and Galtanol.

Duration of Treatment: The average length of treatment was about 140 days—about four months.

Complications: We had few complications—a few cases of swelling of scrotum or in the groin—a

few cases of severe pain—in general we escaped the complications mentioned by some investigators.

MORTALITY: There were four deaths in our series, none the direct result of the injections:

No. 1—Suicide. No. 2—Accident and its complications unrelated to the treatment. No. 3—Had five injections—disappeared—turned up at another hospital — was operated on — evidently very difficult case—femoral vein injured—leg amputated—pulmonary embolus.

No. 4—Cause unknown.

EXPERIMENTAL WORK ON ANIMALS: This apparently shows tissue reaction and fibroblastic response, but only the reports of Kelly,[11] of Detroit, reveal what happens to this tissue at a later date, namely, disappearance of this fibroblastic tissue. Several of our recurrences were operated upon and careful examination of the tissue from all layers showed an almost entire disappearance of this built-up scar tissue. Here lies the crux of the whole matter. Granted that the injections *do* product a bulwark of new fibroblastic or scar tissue, *this does not last.*

INDICATIONS FOR TREATMENT: As a result of our work we believe the cases for suitable treatment by this method few and far between, and in these the most we should promise is a diminution in the size of the hernia so that a smaller truss can be worn; such a patient must be sentenced to a life of ease.

ESTIMATION OF END RESULTS: Many investigators are reporting so-called "end results." These should be carefully studied and evaluated. In most cases the follow-up period is about a year, and often less than that *after* the removal of the truss.

Fowler[12], one of the most experienced protagonists of injection treatment, says: "The frank and truthful answer is that as yet we have but little exact and dependable information as to the recurrence rate after the injection treatment. For myself, I cannot even pretend to have kept track of enough of my cases for a sufficient length of time to warrant my even estimating the recurrence rate."

Conclusions

THE conclusions we reached regarding the injection method are, as follows:

It is extremely difficult to deliver the solution to the exact spot needed to obliterate the sac.

Temporary proliferation, even if accomplished, gradually absorbs.

One solution is about as useful, or useless, as another.

Precautions and dangers are few.

Only indirect inguinal cases are suitable.

The test must come a year *after* removal of truss *and* resumption of ordinary activity.

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Maintaining Employee Health

— *Through Periodic Physical Examinations* —

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IN RECENT years we have witnessed many changes in the industrial relationship between employers and their employees. These changes, while in some instances resulting from arbitrary action on the part of an employer, have in most cases been the result of statutes, both Federal and State, which extend to employees the right to organize and negotiate for the purpose of representation, working conditions, and other purposes. This new situation, to a great extent, has created a growing conviction in the public mind, as well as in the mind of the employee, that he has a distinct and recognized right to his job, and it therefore follows that he feels he has the right to work and continue to work in order to provide for himself and his dependents.

This belief is further supported for the employees by statutes providing Social Security and Unemployment Insurance.

The railroads were probably among the first industries to recognize this right of employees to organize and negotiate for working conditions, etc., but in recent years other industries have begun to follow the railroad practices, either voluntarily or as a result of Federal or State statutes and decisions by boards established under those statutes for the purpose of determining such matters.

These changes are of considerable importance to industry in general, particularly because of the requirements to negotiate working conditions, which include wages, etc., and are therefore naturally resulting in increased labor cost. Other rules negotiated protect seniority, which means that an employee who once establishes himself as an employee can no longer be discharged at the pleasure of some shop foreman, his immediate supervisor, except for just cause, and then only after proper investigation, and subject to certain appeals. Some State and Federal statutes under such conditions tend to protect the individual for a period of time

until he can again establish himself on some other job.

As a result, the employer should place greater importance than ever upon the health of the employees whom he engages, as well as their type and character, since such employees are liable under established rules to become permanent employees of the employer.

INDUSTRY must, of necessity, concern itself with productivity, which in turn depends upon efficiency and this in turn upon the general health of the employee. Under normal circumstances, a healthy worker is less prone to injury and sickness, and therefore, can expect a long life of service to his employer. He will have fewer accidents, and, by nature, the healthy worker will effect a more rapid recovery than the unhealthy worker.

A long and active life of service to the employer is essential for the employee under present day conditions because of pension arrangements, which, where in effect, depend entirely upon length of service, combined with average earnings. In the maintenance of pension funds, in some instances, both employer and employee participate on some established basis.

The problem of maintaining the health of the worker has not been entirely solved in a satisfactory manner. Government supported and supervised medical care for all people has been vigorously advocated by some sources, but we need only compare the average health of workers in certain foreign countries which now maintain government supported and supervised medical arrangements, with that of our own workers under present day conditions, to find adequate and sufficient reasons for rejecting these proposals.

The average person is not aware of the fact that the most important causes of disability and death today are the degenerative and neo-plastic diseases, which may be prevented and which may be cured if they are observed and recognized in their early stages. Many of the scourges of mankind that persisted for centuries have been practically eradicated by medical science, and, today, pneumonia, heart disease and cancer are the main causes of death. Even the dreaded pneumonia in recent years has lost much ground due to the effective weapons developed by medical science in the names of serology and chemotherapy.

At the present time, the degenerative diseases and new growths that are without symptoms in their early stages continue as the main and principal challenge to medical science. The American Medical Association on behalf of medical science in this country has endorsed periodic medical examinations as the most important and the most effective means of maintaining the health of our people. This solution to the problem is not a theory alone, but is borne out and supported by the experience of major insurance companies, as well as by those industries which have interested themselves in the physical welfare and health of their employees. In comparatively recent years, industries have found and proved that periodical examinations of their employees do result in improved health and make for more efficient work and consequently lower the manufacturing cost from a labor standpoint.

In the past, some employees through their organizations have been opposed to physical examinations under certain circumstances. Their opposition has generally been founded on the fact that the physical examination has been used all too frequently for the benefit of the employer and accordingly discriminated against members of labor organizations, etc., who were not considered desirable employees. They do not object when the physical examination is carried out as a general health program for the workers.

PROPERLY to establish a recurring physical examination program, which will operate most satisfactorily from the standpoint of both the employer and the employee, it is necessary to first establish a medical department which is well trained in industrial and preventive medicine and yet is entirely able to gain and enjoy the continued confidence of both the workers and the employer. All physical examinations under such an arrangement must, of necessity, remain confidential between the medical department and the employee, in the same manner that such an examination remains confidential between an employee and his personal physician.

An applicant or a new employee should undergo a complete physical examination for the purpose of determining whether or not his physical condition justifies the assigning of him to the job he is to perform. There should further be considered any subsequent work that might be required of such an employee, under seniority rules. After this first examination, and if accepted as an employee, a recurring examination at stated periods should be carried out and the employee advised of his physical condition in order that he might consult with his personal physician and have remediable defects corrected in their early stages. The essential part of such a plan is, as we have previously stated, that the examination and the re-examinations remain as confidential matters between the employee and the medical department in just the same manner that this information remains confidential between a patient and his physician. It is our belief that only in this manner can the confidence of the employee be gained and the fears of the past abuses be eliminated.

Approximately 10 years ago, Dr. J. Frank Dinnen, Chief Surgeon of the Erie Railroad, had the courage and foresight to institute a physical examination program applying to certain employees in the engine and train service, which is based on such a fundamentally sound basis. Today, by far the large majority of these Erie employees fully realize the direct benefits they have derived from these examinations, and they know

that the abuses usually associated with such a program in the past have not arisen. This plan also requires a physical examination for every employee entering the service, regardless of class. Other regulations require re-examinations where employees have been furloughed for periods of in excess of six months, or have been absent from the service because of illness, or injury; and under these re-examinations, which are compared to records of the past, much good has been accomplished in recommending corrective treatment.

This type of physical examination and physical re-examinations at stated periods is ideally suited to present day conditions. Employees are properly selected in the first instance, and re-examinations tend to detect developing conditions that are found in their early stages, and arrangements are made for proper treatment.

To consider this from a humanitarian standpoint alone, the additional cost, that might accrue in the maintaining of such records for all employees, is well justified, but further than this, the benefits resulting to the employer in having healthy employees, and accordingly increased effiency and productivity, are benefits which cannot be over-estimated.

Because of the fact that the employers under present-day conditions have lost much of their former privilege of hiring and firing, a greater burden is placed upon labor representatives in that upon them falls the responsibility of being able to furnish healthy employees, and they therefore become interested to a large extent in knowing that their membership is a healthy membership, not only willing and ready to work, but physically able to work.

Even though labor has not assumed this responsibility as yet, they are, however, deeply interested, and it therefore becomes a responsibility of the employer to establish employment regulations which require physical examinations on entering the service as an employee, and physical re-examinations at stated periods, as hereinbefore mentioned, and on the basis that such examinations are confidential between the medical department of the employer and the employee.

Occupational Diseases in Ohio

FROM the date of the first report (May 15, 1913) to the end of 1937, 22,027 cases of occupational diseases have been reported to the State Department of Health.*

In the decade from 1928 to 1937, inclusive, a total of 12,931 compensable cases have been reported. Dermatitis was responsible for 8,730 reports, or 67.5%; lead poisoning was next in frequence with 1,464 cases, or 11.3%, followed closely by tenosynovitis (hand) with 1,452 cases, or 11.2%. Chrome ulceration headed the remaining compensable diseases reported with the relatively small total of 390 cases, or 3.0%. No case of glanders, manganese dioxide poisoning, or radium poisoning was reported during the entire 10 years.

Certificates received by the Bureau of Occupational Diseases during 1937 totalled 1,693, exclusive of 77 semi-official reports received from the Industrial Commission but not from physicians. Of this number, 1,390 (82.1%) were males and 299 (17.7%) were females. Sex could not be learned in 4 cases.

Among the compensable cases, dermatitis, the most common occupational disease, was responsible for 1,069 cases, 63.1% of the total cases and 68.5% of the compensable cases; 860 (80.4%) were males and 207 (19.3%) were females.

Compensable occupational diseases other than dermatitis accounted for 490 cases, of which 418 were males and 72 were females.

Poisonings comprised 218 cases, and 13.9% of the compensable cases.

* From a Report by KENNETH D. SMITH, M.D., Chief, and J. B. KISTLER, M.D., Medical Supervisor, Bureau of Occupational Diseases, Ohio Department of Health.

The Medical Department

— *and Its Relation to Other Personnel Activities* —

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IN CONNECTION with this subject it is well to remember that personnel activities are a combination of functions, each one being concerned in some way with the *health, welfare* or *interest* of the employee.*

Compensation laws, benefit plans, sick and accident insurance, are all bringing to the employer the realization, in a financial way, that human failure is a matter of cost in a manner very similar to machine failure.

Anything which retards output or tends to reduce efficiency will be tolerated in industry only as long as it is absolutely unavoidable. That is why the Medical Department plays an important role in its relationship to other personnel activities—for sickness, injuries, fatigue, improper selection and misplacement of workers play a large part in diminishing output and always increase the cost of doing business because of their direct effect upon employee attendance, contentment, general skill, labor turnover, compensation awards, and so on down the line.

If medical service is limited to the routine "finger wrapping" phase of its activities it cannot contribute very much of value to the general plant welfare. The assigned or expected duties of the medical department have gone beyond the care of injuries, and are pointing now, toward preventive machine and public health—this is

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probably due in part to improved accident prevention technique, industry no longer providing a "happy hunting ground" for the traumatic surgeon. Naturally the effectiveness of the service depends to a large extent upon the qualifications of the physician and nurses in charge and to a large extent upon the degree of encouragement given the department by the employer.

In order to fully realize the idealistic aims of the medical department, i.e., to safeguard health, relieve suffering and extend human life, it is very necessary for this department to collaborate with the other personnel activities such as employment, safety, compensation, insurance, education, industrial and public relations, sanitation, and many others.

Insurance

WE WILL consider for a moment the relationship of the medical department to the insurance division. Group insurance, as you know, is a type of coverage in which all employees are insured under one master policy without physical examination and at a reduced cost. There is usually a sharing of the premium burden by management and employees, and there is possibly a stipulation which permits workers who leave the firm to convert group policies into other standard forms without medical examination. These policies provide payments for non-compensable accidents, non-compensable illnesses, and death. Some firms provide coverage for unemployment and other contingencies as well. These claims passing through the medical department provide an incentive for the industrial physician to actively concern himself with matters pertaining to employee health, and afford this department a chance to gather and interpret information relative to the general plant population.

The doctor in industry is availing himself of the opportunity for this type of statistical study. His records follow the employee from the time of employment, and with our present seniority setups, usually until the time of death. Nowhere else can follow-up be made so complete.

The alert industrial physician uses these figures as a base line in comparing the plant population with other groups in the community. Occasionally from this source it is possible to detect some factors which might affect the lives of working men and perhaps be responsible for the spread of certain conditions. With prevention each year becoming a more insistent demand, and in the interest of prevention, the nature of the worker's occupation is receiving a new medical attention. The plant medical departments might very well ask themselves whether or not they have a greater incidence of T. B. than that experienced by the average population, or whether the incidence of psychosis, neurosis or any other condition is greater than that of other groups in the community. It is possible in this way to detect variations from accepted normal averages or standards.

Workmen's Compensation

THE medical department is not directly responsible for the adjudication of compensation cases. However the department often serves in the capacity of arbitrator between employer and employee in order to protect the latter from types of employment for which he is physically or mentally unsuitable, and to see that he is justly compensated for unpreventable injuries arising from his employment.

In every case of industrial injury the concern of both the physician and workman is an early return to the work at which the worker was employed at the time the accident occurred. Frequently it is impossible for an injured worker to resume his original work. There comes a time when he can work somewhere in the plant. If this can be done to his financial advantage he is returned to work, remaining, of course, under the supervision of the medical department. An early return to work is thus frequently a therapeutic measure, and a move usually welcomed by the compensation department.

Cooperation between the medical and legal professions becomes more and more necessary. The compensation department not only permits this cooperation, but actually expects and demands it.

Even though our accident experience rates are on the decrease, it seems that the number of cases involving medical testimony increases year by year. Every case seems to involve some new evidential problem.

The compensation department is just as interested in good adequate medical care as is the medical department, for this is quite basic in minimizing disability and compensation cost. Both departments realize that prompt and efficient care of the injured is the keystone of the structure of sound compensation practice.

Where the employer provides surgical care and service, the employee is likely to suspect both the medical and compensation departments of being in collusion against him. Therefore it is usually necessary for the medical department, in order to retain the injured's confidence, to ally itself with the man, and perhaps occasionally champion his cause. When and if the patient is made to feel or believe that the medical department is allied with the compensation department, he will soon look around for an impartial physician to take care of him.

Compensation departments naturally expect complete reports and records, based on thorough examination and good judgment — reports which when they become subjects of litigation or controversy, must stand up fairly well in comparison with others. This is one way in which the medical department can gain the approval of the average claim man. Nothing is more exasperating than for the claim man to have to send a case to an outside consultant, merely to get a two-page report for his files.

Also claim departments may be impressed but not greatly interested in technicalities that cannot be translated into plain English. The medical

department must be able to translate its thinking to a group of laymen who must adapt the medical to the legal phases of the case.

In order to serve the compensation department completely it is absolutely necessary that medical departments submit evaluations of various disabilities which can readily be translated into actual terms of mathematical loss.

Compensation laws and various kinds of health legislation have served to focus attention upon the maintenance of the worker's health, and the relationship of the industrial medical department to the compensation department. Some states require periodic medical examinations of employees who are engaged in occupations in which the health hazard is considerable. Pre-employment examination is a collateral development to this, so that the employer may not knowingly hire men whose physical handicaps may be aggravated by employment. The employer's motives here are justified on the basis of protecting himself against future compensation claims.

Industrial Relations

THOSE of you who heard MR. WHITING WILLIAMS, Monday evening, fully appreciate the importance of this subject. He mentioned many of the variable approaches. But regardless of whether the approach is economic, psychological, or sociological, it has been evident that the medical department plays an important part in this particular personnel activity.

There is no question that one of the most important phases of the labor problem is that of creating and maintaining the good will of labor. Plant managers take professional skill for granted, and are asking, in addition, that our doctors and nurses be personnel minded, and be of definite assistance in creating employee good will. The members of the medical department do not sit apart in their offices, shutting themselves away from all personal contact with employees, and knowing them only through impersonal records. They usually know that John's wife is going to have a baby, that Jim couldn't live two months without his insulin, or that so and so who is always coming in, blaming the plant cafeteria for serving indigestible pork sausage, really needs a fat-free diet.

All concerns, especially the larger ones, are making a real effort toward the improvement of their machinery for getting into their industrial relations that quality of friendliness and intimacy that is found in smaller companies. There is no place in a large organization where this spirit can be more effectively sponsored than in the medical department.

Industrial relations begin with the employee's very first contact. The physician makes certain that the new employee gets the right impression of his new employer, the company, and his job, through his initial contact with the employment and medical departments.

Doctors and nurses are the closest points of contact between management and men; they meet them in an examination room and on numerous occasions after that, usually when workmen are most receptive. All these afford excellent opportunities for the physicians to cement the good feeling that we like to see between management and men. It is absolutely essential in this respect that the industrial physicians and nurses sell themselves both to labor and management without encroaching too much on the managerial side of the business or too much into the realm of private practice. Doctors can sell themselves to management by the use of good judgment, knowledge of plant conditions, and professional skill; and to the workman by their ability as physicians, their familiarity with conditions out in the plant, their personal relations with the workmen, and the respect they get from physicians in private practice.

One of the most fundamental problems in labor relations today is the determination of employee attitudes, which constitute the basis of all satisfactory employer-employee relationships. With our medical department contacting between 4% and 5% of our plant population daily, this department is thus provided with a good opportunity of evaluating these attitudes, as well as applying corrective measures. It is a known fact that low vitality, malnutrition, continued over-eating and under-exercising, bad liver and bad lungs — all these modify the individual's behavior. Until managers face the problems of their workers' attitude in terms of physical and mental fitness, they will fail in trying to foster qualities which do not manifest themselves in the absence of good health. Often times because of the confidence which employees place in him, the industrial physician is able to discover the causes of industrial discontent, to iron out difficulties between the foreman and the worker, or perhaps aid in adjusting things at home, or possibly call attention to cases where legal and financial advice and aid are needed.

Naturally, in order to be most effective, the entire medical department must be temperamentally geared to fit into the industrial relations program of the plant it serves. It is equally important to make certain that we do not go too far or become too paternalistic in our effort, for I believe most industrial medical department and personnel men have learned that assuming responsibility for all medical ills of the employee and his family soon becomes a discordant note, in any industrial relations set-up.

Industrial physicians, by serving as a bond between the employer and employee and the private practitioner, can create something between the interested groups that will allay criticism and make preventive medicine that much more effective.

Our so-called industrial relations, employee relations, etc., are nothing more or less than human relations. Members of our medical departments, by past training and the nature of their work, are fairly conversant with the technique of handling humans — they are past masters of principles which we are trying hard at present to inculcate in the minds of our foremen and superintendents.

The medical department's effectiveness in creat-

ing good will lies entirely in the willingness of every member of the department in taking a personal interest in human relations, and in being willing to become a friend and leader of men in the plant. The medical department must be able to meet all men on the common ground of human and mutual understanding and good fellowship, in spite of any disagreement which may be in existence between management and men.

At present we are devoting a great deal of attention to the part that physiological problems play in our industrial relationships. Fundamentally, of course, this type of approach seeks to measure the physiological adaptation of the employee to his particular job. The medical department, with a background of experience, learns to provide simple measurements of important physiological characteristics, such as strength, endurance, fatigue, measurement of strength of arms, legs, hands, and back, for particular kinds of work. The medical department in seeking to discover, and in identifying, weaknesses and tendencies which predispose toward occupational disease, is doing an industrial relations job of the highest order — for the fact is apparent today that better adjustment between men and their jobs is an important factor in creating greater satisfaction in work and in making possible the payment of higher wages, which in turn has a favorable influence on our industrial relations in general.

The entire problem of so-called "Human Engineering" has tremendous possibilities in our industrial relations program. Very frequently our medical departments disclose a physical disability, or an unsatisfactory home or family situation in some of our maladjusted individuals. Often times in these cases our medical department points out certain complexes or neuroses which disqualify these individuals from active participation in the work assigned. There are definite pathological aspects to many individual problems, which if uncorrected or unidentified, may greatly disturb industrial relationships.

It is equally important for the medical department in its relationship with other departments, to point out that the efficiency curve of an employee is not merely a line on a chart which indicates the number of pieces produced in a given time, but is also a graphic picture of the physical conditions of the worker, his mental attitude toward his job, toward his fellow workers, toward his boss, and toward his company.

The Matter of Sanitation and Hygiene

WE WILL not take time to elaborate on this particular phase, since it has been covered in detail in previous papers. We merely wish to point out that sanitation and hygiene, when sponsored by the medical department, can be expressed in terms of worker comfort, and achieve good results.

Sanitary shower baths, toilets, and wash rooms conveniently located do much to conserve employee health and comfort. Spotless lunch rooms, removed from the *noise* of the machines, provide the necessary mental and physical "pause that refreshes." Making the shop cheerful in appearance by expansive areas of glass, carefully laid out lighting arrangement, also has a definite bearing.

Matters of sanitary and health provisions may rest in the medical department either directly or in an advisory way, but regardless of administrative detail, the medical department's relationship here is an important one.

Employment

THE employment department is in contact with the medical department through the physical examination of applicants and transfers, and the placing of subnormal workers at work for which they are physically fitted.

Most medical departments feel that a close relationship should exist between the medical and employment departments, and that the physician should be so thoroughly conversant with his plant that he can say with absolute certainty and finality that an applicant is physically or temperamentally suitable for a certain job.

New employees bring with them certain afflictions, infirmities, defects and impairments which either render them unemployable or which restrict their activities. Men fail in certain jobs for one of two reasons: *First,* the training and past experience may have been insufficient, or *second,* the applicant may not be in a proper physical condition for the work. While the employment department is competent to judge the former, the latter can be determined only by an examination performed by a physician.

Under the present labor conditions in industry, it is becoming increasingly obvious that the preemployment examination is becoming more and more important. We realize that this examination cannot be too thorough since it establishes the standard of comparison for all subsequent considerations of the employee's record.

It is just as essential for our medical department to appraise our raw material on the human side, as it is for our standards department to evaluate it on the material side; to place workers physically and mentally just as the plant engineer provides the proper mechanical equipment for a certain operation.

In the years between 1920 and 1930 industry was primarily concerned with getting men to do the work. Since then the emphasis has been on getting the proper or right kind of men. The capabilities, general abilities and interests of men play a very important part in selection. The employment or hiring function therefore cannot be successfully performed without working in close cooperation with the medical department.

Public Relations

IN THIS matter of public relations the plant medical department is the proper agency to cooperate with public and other agencies which are designed to foster employee health, such as the Red Cross, anti-tuberculosis and anti-cancer associations, public health departments, special clinics, and so on. Many of these agencies are able

to relieve the company medical department from entering this line of endeavor on their own. Since health measures of this type are a community responsibility it is essential that the plant medical department actively support and cooperate with these extra mural health activities.

Important from a public relations standpoint is the relationship to the general practitioner. This relationship is most effectively sustained through the medical department.

The industrial medical department is a distinct public health asset. The constant medical supervision of a large group of workers, most of whom have families, the information as to facts of disease and of hygiene given them, the segregating and reporting of cases of contagious disease, and the constant effort to protect against industrial disease, have a definite effect upon the general health of the whole community. Where the community is largely industrial, the effect of several well-run industrial medical departments is considerable.

The importance of these activities is emphasized from a public relations standpoint especially when they are lacking, therefore every precaution must be taken to make certain that they function at all times, and to the fullest extent. Industry at present is carrying its right for existence and for profitable operation more or less directly to the public. It asks for community support and cooperation. As a part of this program, industry must, in return, in order to justify community support, maintain clean, safe, and healthful plants.

Now we will consider the relationship to safety:

William S. Knudsen, President of General Motors, has frequently stated that "Safeguarding our employees from accidents is in my opinion the greatest and most important task before us at all times." We are all aware that in recent years great strides have been made in the reduction of injuries, fatalities and industrial diseases. Industrial accident frequency was 61% lower in 1937 than 10 years ago, with the seriousness of accidents declining at a comparable rate. In a world of technological improvement, men and women are relieved of the tedium of toil, and are working in environments of safety, and controlled light and climate.

As long as insurance rates are directly dependent upon previous experience, management is eager to see that accidents shall be reduced to a minimum. Thus our increasing dependence upon experience rating has directly stimulated safety programs, and placed our medical departments in the position of sponsoring prevention in addition to treatment and cure.

The safety program, in order to function effectively, should be very closely associated with the medical department. There has been, in some instances, a tendency for the safety activities to be sponsored in isolation from the medical or health activities, even though a number of research studies have established a correlation between sickness and accidents. I believe we are all agreed that engineering or legislation cannot greatly affect something which is primarily of a personal nature.

It is a generally known and accepted fact that in industries where efficient medical service is lacking, the frequency and severity rates are considerably higher than in the industries where good medical service is available.

The larger manufacturing concerns have been remarkably successful in reducing the number and severity of industrial accidents in their plants. Aggressive and competent medical service, both preventive and curative, has been the major weapon in their hands.

Preventive Medicine

IN YEARS gone by we have provided first aid stations, medical departments and industrial hospital for care of the injured. We have taken the sick and the injured as they presented themselves, asking few questions and assuming that fractures and lead poisoning were acts of God and a necessary by-product of industry. Now we are beginning to look at things from a preventive standpoint, and the doctor goes forward with the safety engineer to aid in preventing accidents and sickness, and to our surprise we find that prevention in the plant in connection with accidents and occupational disease is as amenable to the preventive medical touch as was the case in typhoid, diptheria and so on in the public health field. If we accept the philosophy of modern medicine which emphasizes prevention over correction, then it is logical to apply the same philosophy to the prevention of accidents and occupational diseases in our plants.

Some few medical departments in industry still hold themselves somewhat aloof from an active participation in safety promotion. Most medical men, however, appreciate the fact that the application of surgical technique and principle, although praiseworthy, can only treat the specific condition, whereas industry is interested in ridding itself of the cause of the condition.

Safety promotion includes everything in the realm of accident prevention from proper mechanical safeguards down to continuous educational measures. There seems to be an increasing tendency to define occupational diseases as compensable accidents under various Workmen's Compensation laws—thus it has come about that the safety department has welcomed the medical department's cooperation in order to aid in identifying and reducing all possible disease exposures. Uncovering the etiology of these hazards, and applying corrective and prophylactic measures have become an important part of the medical department's function.

The safety-conscious physician begins his safety work with the pre-employment examination. The physician must be familiar with the job the applicant is expected to perform. In this way he knows whether poor vision, color blindness, high blood pressure, potential hernia, etc., is permissible from a safety standpoint. There is a wide range in the average plant — defects disqualifying a truck driver or crane operator may be permissible in a janitor, sweeper, or tool crib attendant. The medical department's experience in connection with ac-

cidents indicates that a greater part of lost time does not result from actual accidents, but rather from occupational injuries and from pre-existing pathological conditions which, through a minor accident or incident, become major disabling conditions. The physician in industry today is devoting more and more attention to occupational injuries with prevention as the motive.

The doctor also pays a great deal of attention to safety equipment—this applies especially to workers in lead exposures, where proper clothing, and bathing facilities, etc., must be provided. The doctor is in position to state the type of goggle to be worn on a specific job, specifying color and shade of lens, etc. The physician's knowledge of his plant will often make it necessary for him to advise helmets, respirators, gloves, leggings, or other protective devices.

The Problem of Our Accident-Prone Employees

IT IS a fairly well known fact that about 75% of industrial medical service is bestowed upon 30% of the workers. This 30% also requires more attention in every other way, for within this percentage are found our radicals, neurotics, indigent, and possibly our worst workers. Years ago we accepted this situation as a necessary by-product of our production. A large proportion of our accidents are not mechanical but personal. We believe that 80% of them are attributable not to mechanical failure, but to personal carelessness or human failure, ranging from failure to report slight accidents to the medical department, to complete lack of cooperation, if not recklessness, which some of our employees exhibit. At the moment, however, many of our medical departments are coping with this problem successfully.

Time does not permit detailed consideration, but only to indicate that studying the causes of accident proneness has resulted in applying a partial cure along certain lines.

The physician in addition to learning about jobs and machines has an opportunity to observe those conditions which may contribute directly or indirectly to safety, such as lighting, dust control, ventilation, fatigue, humidity, and general sanitation. These are not simply words in a sentence, after the emphasis given them at Nela Park, and by Mr. Houghton and Dr. Dill on Monday.

Safety directors and inspectors have come to realize that the routine inspection serves very well for the determination of possible accident hazards. But when it comes to ferreting out a potential occupational disease hazard—that is a matter for the hygienist or physician.

In active safety promotion, the medical department should be so organized that every contact made by physician or nurses should be used for selling safety—constructive hints as to lifting, type of safety equipment, care of the skin, etc. The plant physician should also contribute his viewpoint to all safety meetings held by the various safety committees, foremen or employees.

As a definite adjunct to safety the alert medical department should supervise the training of the maintenance men, electricians, patrolmen and others in "principles of first aid to the injured." Artificial respiration and the general handling of the injured are as important at times as the actual surgical treatment itself, and must be made a part of any effective safety program. It is felt in this connection that the instruction of employees in first aid, aside from enabling them to take care of emergencies, also stimulates them to greater interest in accident prevention.

We are not trying to infer that the doctor in industry should assume full responsibility for accident prevention, but to act somewhat in the capacity of a catalytic agent, without which certain and complete results are impossible.

Education

LAST but not least, just a word about the medical department's relationship to the educational department. You and I know that the training and education of employees is not a simple problem. Regardless of which personnel problem may appear to be the most pressing, the one and only certain method of attack is more and better training. In industry, as well as in society as a whole, education is the only available and direct corrective. Through this medium we are trying to improve production efficiency, improve industrial relations, interpret corporation policy, and reduce accidents and improve workers' health.

Industry is certainly mindful of the fact that our general health education of the past 20 years has greatly reduced illness and accident rates. Industry has profited as a result of this tendency, and is doing a great many things of its own volition to bring about further improvement. In order to do this effectively the plant medical department has found it necessary to do many things which, perhaps, only indirectly belong to industrial medicine and surgery. For instance, the medical department makes available to workers and their families, in popular style, messages on health in the plant newspaper, etc. Doctors and nurses are also taking an active part in our foremanship training courses outlining industrial as well as personal health and hygiene.

The medical department must, above all, know where its responsibility begins and where it ends. This holds in its relationship to other departments as well as to the community as a whole. We feel that our medical department has served its function when it has endeavored during the working hours of the day, to prevent industrial disease and injury, to alleviate and correct these conditions when they occur, and to instruct the employee in the art of keeping well. As pointed out in Dr. Victor Heiser's recent article, when the medical department attains its ultimate objective, the entire personnel function is improved by achieving reduced absenteeism, lower accident frequency, more rapid recovery from illness or injury, perhaps a lower mortality rate, increased efficiency, lower labor turnover, and improved employer-employee relationship.

[NOTE: The articles referred to, by WHITING WILLIAMS, DR. LUCKIESH and MR. HOUGHTON, will appear in early issues of this Journal.—Ed.]

Thyroid Surgery

—*Some Emergencies and Complications*—

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IN THYROID surgery, most of the emergencies and complications can be prevented by satisfactory preparation, selection of established procedure at the proper time, good exposure, and gentle handling of tissues.* Therefore, let us give this subject general consideration before taking up the various pitfalls.

Coexisting diseases, such as diabetes mellitus, Bright's disease, cardiovascular, or liver damage, should be given due consideration. Other things being equal, the patient having such coexisting disease is a poorer risk. Advanced age is no contra-indication to thyroid surgery, but the mortality rate is definitely higher in this class of patients.

Iodine, rest, sedatives, and high food intake, especially carbohydrates, pre-operatively as well as postoperatively, are very important factors in the management.

A toxic goiter patient improving and gaining weight under pre-operative care is usually a good risk, while, if the symptoms are progressive, the mortality is correspondingly higher. If Lugol's solution does not allay the symptoms during the pre-operative stage, quinine or ergot should be tried. If iodine is valueless before the operation, it need not be given to prevent a postoperative crisis. In many of the goiter districts, the laity, in spite of professional advice to the contrary, are taking iodine which, in many cases, excites the goiter. It is in these instances that Lugol's solution in the preparation for thyroidectomy frequently aggravates the toxicity.

If the metabolic rate is above 30, a postoperative reaction or a so-called "storm" should be anticipated. Many thyroid surgeons consider the patient's morale, pulse rate, and the general condition a far better index than the metabolic rate; but few operators are willing to offer a good prognosis if the metabolic rate remains at 60 or above. Statistics show that thyroidectomy on patients with a metabolic rate above 40 has a high mortality.

Many practitioners are laboratory prejudiced because, owing to faulty technic, they have been misled. One metabolic reading should never be considered final. The metabolimeter in the hands of a skilled technician is a definite asset to the thyroid surgeon.

SAFETY should not be sacrificed for a small scar. One should not hesitate to divide muscles if indicated. However, in the majority of cases such division is unnecessary. Approaching the gland, care should be taken not to tear the veins. The gland can be delivered from its bed by gentle traction and blunt dissection with the finger. Nodule after nodule can be freed and delivered into the wound. At no time should force be used. Some adhesions and attachments are divided by sharp dissection. Early division of the isthmus often simplifies the operation and expedites delivery of the lobes. The line of cleavage should be determined and the capsule closely followed. Dissection of surrounding tissue invites complication. But in spite of the best surgical technic accidental hemorrhage occurs. Profuse bleeding may follow delivery of an intrathoracic goiter, due to tearing of the veins. Vessels of appreciable size must be ligated, while general oozing may be controlled by temporary packing. Hemorrhage from a retracted superior thyroid artery is difficult to control. Good exposure and double ligation of the superior poles minimize this danger.

Some operators persist in ligating both inferior thyroid arteries. In my judgment this should not be done, because it endangers the blood supply of the parathyroids. A number of deaths from gangrene have been reported.

Tetany is prevented by guarding parathyroid blood supply and leaving sufficient capsule and thyroid tissue as a protective measure. Patients complaining of numbness, tingling and stiffness should be given calcium. This drug is more effective if given before convulsions develop. Permanent injury to the parathyroids is one of the most trying conditions following thyroid surgery because, eventually, the patient becomes immune to calcium and parathyroid extract — with resultant invalidism.

Exposure of the sensory nerves by too close dissection along the trachea and larynx causes reflex coughing and edema of the larynx. This predisposes to pneumonia. Distressing cough requires narcotics in sufficient dosage to relax the patient. In some cases, bromides, or 5 grains of aspirin with 5 grains of veronal suffice. Inhalation of tincture benzoin compound vapor has a favorable effect. Narcotics should not be given to the point where cough reflex is destroyed because that leads to accumulation of mucus and the patient fails to expectorate. Those of advanced years when given large doses of morphine may enter into final coma. To such individuals this drug should be administered cautiously. Local anesthesia supplemented by a little nitrous oxide is safer than deep narcosis.

Removal without damage to other structures of sufficient thyroid tissue to prevent continuing or recurring hyperthyroidism is the chief problem of goiter surgery. Exopthalmic goiter is primarily not a disease of the thyroid gland. Yet, thyroidectomy serves to break the pathological chain. According to some observers, recurrence of hyperthyroidism is not necessarily due to inadequate surgery; however, this no doubt is responsible for most recurrences.

ACCIDENTS are more likely during the second operation. Adhesions render the dissection difficult. The danger to nerves, vessels, para-

* From a paper read before the annual convention of the Aesculapian Society of the Wabash Valley at Paris, Illinois, October 27, 1938.

thyroids and trachea is greater. Conscious of recurrence, the operator is more radical and in his zeal to cure may venture beyond the safety zone.

Occasionally, a postoperative myxedema develops. Thyroid extract is here indicated. A small amount of thyroid tissue left at the lower poles prevents this complication. A low metabolic rate in large goiters is no surgical contra-indication. In fact, metabolism is improved by partial thyroidectomy.

EMBOLISM: Air embolism caused by division of one or more unclamped large veins, especially the external jugular, is comparatively rare, but may cause sudden death when it occurs. The treatment indicated is prophylactic—that is, clamp or ligate these veins prior to division. If it is discovered that an important unclamped vein has been divided, immediate digital pressure on the proximal side will control the situation until a clamp can be applied.

INJURY TO TRACHEA AND OBSTRUCTIVE DYSPNEA: A lobe or nodule may cause angulation or displacement of the trachea or softening of the rings with partial obstruction. In such cases, damage to the trachea by clamping, incising, or tearing may result during delivery of the goiter. Some goiter surgeons routinely determine the course of the trachea by x-ray prior to surgery. The trachea should always be located primarily, commencing at the suprasternal notch and followed upward. If the course appears abnormal, the isthmus should be divided to expose the trachea to its upper limit. Collapse with complete obstruction of the trachea has followed removal of the lobes, this on account of continued pressure over a long period of time. The condition manifests itself by stridor and suffocation. Immediate tracheotomy is indicated to prevent sudden death. If the trachea is greatly damaged and blood aspirated, such foreign material should be removed by suction. In extreme cases, postural position to favor drainage has been resorted to. If there is any preoperative evidence of partial obstruction, deep ether narcosis is contraindicated. Concealed postoperative hemorrhage may cause undue pressure on the trachea with its accompanying dyspnea. Such accumulation of blood is recognized by massive uniform swelling of the neck. This complication — which can be prevented by inserting a small rubber drain—should be treated by opening the wound, removing the clot, ligating the bleeding vessel or by packing the wound.

NERVE INJURY: Next to death, the most commonly feared accident is permanent injury to one or both recurrent laryngeal nerves. This is particularly true in toxic goiters in which the maximum amount of glandular tissue must be excised. Occasionally, the nerve is caught in a tie. This produces a temporary paralysis. If caused by division, the paralysis is permanent.

In delivering a nodular goiter, injury to the recurrent nerve can usually be avoided by hugging the gland with the finger and delivering, carefully and gently, nodule after nodule.

FOR postoperative care, the patient needs fluids, food, rest and iodine. The sitting posture is preferred. In toxic cases, and especially if fluids are not well retained by stomach, 2000 cc. of 5% glucose in normal salt solution should be given by venoclysis daily. In the event of crisis this amount should be doubled. Ten to 15 minims of Lugol's solution three times daily are routinely indicated. Liberal ingestion of carbohydrates is essential. This line of treatment prevents to a large degree postoperative storms associated with toxic goiter. Narcotics and sedatives are given as required. High temperature is combated by fluids and ice caps.

If, in spite of all precautions, auricular fibrillation follows, strophanthus or quinine is usually prescribed.

Following thyroidectomy on toxic goiter patient, one should not wait for a postoperative reaction or so-called "storm" to develop but should institute a course of treatment which, experience has taught, will prevent or reduce to a minimum such complications: namely, the administration of Lugol's solution, venoclysis of glucose in normal salt solution, sitting posture, rest which requires narcotics and sedatives, and food, especially carbohydrates.

Occasional vomiting is no contra-indication to giving such patients a soft diet as well as fruit juices liberally.

In conclusion, it has been my purpose to present a few of the emergencies and complications encountered in thyroid surgery. Regarding the treatment, I cannot improve on the common slogan, "Treat the complications before they develop."

Injuries of the Kidneys

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WITH the increasing number of traffic and industrial injuries, due to modern speed, the problems of compensation and the question of accurate diagnosis give us great concern in all accidents, whether they be minor or major. During recent years, injuries of the kidneys have been gradually demanding more consideration, than at any time in the history of medicine.

Injury to the kidney were known from the time of Hippocrates, Galen and Celsus. Ambroise Pare, in the year 1598, mentioned some of the symptoms in injury of the kidney, and since that time numerous contributions have appeared on all of its phases.

When one considers the distinct anatomical-lumbar-retroperitoneal position of the kidney, it is hard to think of much damage being done unless due to some most severe crushing injury or to some penetration by bullet or knife; but, contrary to this, closed injuries of the kidney are by far the most common and may be due to direct trauma

over the kidney region, abdomen or lumbar region. They may also be due to indirect injuries, such as a fall from considerable height, the subject landing on his feet or buttocks. Occasionally a renal injury may be caused by a sudden muscular contraction from unusual effort. Sometimes we may have the history of only a slight injury and yet find very extensive damage to this organ; other times we may have a very severe injury and find little or no damage.

Factors to be considered are contusions of the kidney against the vertebrae or the ribs, punctures by fractured vertebrae, ribs or pelvic bone. A rupture may occur in a kidney that is the site of some pre-existing lesion, such as a hydronephrosis, pyonephrosis, stricture and kinking of the ureter. Some tumor of the renal parenchyma, pelvis and ureter may enter in as an additional causative factor. Also tuberculosis and calculus in the pelvis or ureter, as well as any type of hydraulic back pressure, which might interfere with its normal drainage.

Occasionally we may have an operative injury to the kidney, in which trauma or rupture occurs during surgical intervention. Sometimes it has been observed that rupture of the renal pelvis, upper calyx or ureter is caused by cystoscopic instrumentation.

Open wounds of the kidney may be caused by a knife, sword or other sharp instrument or by a piece of metal or glass, or by bullets and larger projectiles. Open wounds of the kidney are not so common in civil life and are rather infrequent even in time of war. The U. S. Surgeon-General's office reported only 129 kidney injuries in 170,481 battle casualties during the World War.

The many lesions that may be found in the kidney due to closed injury show numerous variations from simple contusion or ecchymosis involving one pole, both poles, the entire parenchyma or even the pelvis and the ureter to complete rupture.

We may classify the different types of ruptured kidney into five main types:

1. Rupture of the true capsule.
2. Rupture of the kidney parenchyma.
3. Rupture of the excretory apparatus of the kidney (calices, pelvis and ureter).
4. Rupture of the blood supply of the kidney.
5. Rupture of the surrounding tissues and neighboring retroperitoneal organs (fatty capsule, muscles and suprarenals).

Still another type may be added because of its clinical interest, namely, rupture of the kidney into subphrenic or thoracic organs, such as the lung, or intra-peritoneally as stomach, duodenum or colon.

The characteristic symptoms of closed renal injuries are pain, hematuria and a mass on the side of the injury, accompanied by shock and rigidity of the abdominal muscles. The pain varies much in severity and is located chiefly in the loin or upper abdomen, but may radiate to the groin or testes. Sometimes the pain may be referred to the side opposite the kidney injury.

Hematuria is observed in almost all cases of renal injury (80 to 95%). The hematuria varies in amount, sometimes being very slight, even microscopic, and at other times abundant. It usually is present soon after the injury, but may not appear for a few hours and sometimes not for several days.

Hematoma, or the development of a mass in the region of the injured kidney, is due to the collection of blood, or of urine, in the peri-nephritic tissues. As a rule when a mass is present, it is fixed, tender on pressure, and accompanied by rigidity of the abdominal muscles. The abdominal tumor or mass may be so extensive as to occupy the whole flank on the injured side. The severity of the injury may be judged by the size of the mass.

Complete anuria is rare unless there is severe injury to both kidneys or to both ureters.

If the injury and pain are severe, there is usually considerable shock, vomiting or nausea. Cases have been reported in which pain and shock were both delayed after the injury, the patient continuing with his work for a time and then collapsing. If the symptoms of shock develop late, it is due to serious internal hemorrhage.

A rising temperature, chills and increase in the leucocyte count indicate some septic infection. A diminution in the red cell count and lowering of the hemoglobin indicate a persistent hemorrhage and increasing anemia, which demands surgical intervention.

Prophylaxis

—*of the Common Cold*—

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THE common cold costs the nation annually about $3,000,000,000.00, and the industrial workers, as well as industry, must bear the greater burden of this loss. The average cold lasts about a week and usually results in the loss of several days from work. Estimating the time lost, doctor bills and medicines, the cost of the average cold to the average industrial worker is about $15.00.

In addition to these startling figures concerning the relative cost of the common cold, it must be remembered that three-fourths of the population have at least two colds a year. This places the common cold at the head of the list as the most prevalent of all diseases, and as industry's No. 1 health problem.

The after-effects of the common cold — lowered resistance, fatigue, and increased susceptibility to other infectious processes — cannot be evaluated in dollars and cents. These, however, often bring about additional loss of time for the industrial worker, and through his absence or the inefficient performance of his daily tasks because of lowered vitality, also loss to his industry.

Any means of either reducing the prevalence of

the common cold or decreasing its virulence is of inestimable value not only to the individual but also to industry at large.

We believe we have found an effective means of preventing loss of time due to the common cold. With the thought in mind that other industrial physicians and industries might profit by our experience, we are presenting data on the result of the administration of Catarrhal Oravax tablets* to more than 900 men at the Tennessee Copper Company. The detailed records of 38 men in our Smelter Department are representative of the value of these tablets in the entire group. We have found them 85% to 90% effective against loss of time for our employees.

These tablets were supplied to each worker in quantities sufficient for them to be taken as directed: for the prophylaxis of the common cold, one tablet daily, preferably before breakfast, for one week, then one tablet twice weekly until a total of 20 tablets had been taken.

These tablets are prepared from a selected group of recently isolated bacterial species chosen for their strong antigenic properties. Each tablet is enteric coated, in order to prevent excessive digestion in the stomach, and contains 50,000 million killed organisms:

Pneumococci (D. pneumoniae) (Types I, II and III)	12,500 million
Micrococcus (Neisseria) catarrhalis	10,000 million
Influenza bacillus (H. influenzae)	10,000 million
Friedlander bacillus (K. pneumoniae)	5,000 million
Streptococci (mixed)	7,500 million
Staphylococcus aureus	2,500 million
Staphylococcus albus	2,500 million

The reactions to the tablets, such as headaches, chills, aches and stuffiness in the head, were mild and transitory and caused the workers little inconvenience. Mild reactions are to be expected from this type of oral immunization, in contrast to the rather severe reactions often experienced after immunization by injection. Many of the workers reported no reaction at all. Because of this lack of inconvenience, the workers' cooperation was excellent.

Practically all of the men reported the prevalence of colds and influenza among the members of their families during the winter.

The men who reported "light" colds were of the opinion that they really experienced nasal irritations due to the dust and gas always present in our Smelter Department, rather than a real respiratory infection.

Summary

A REPORT of the treatment of 900 men at the Tennessee Copper Company for prophylaxis against the common cold with Catarrhal Oravax tablets which were found to be 85% to 90% effective against loss of time for the workers. Data on 38 workers in the Smelter Department are given which include annual susceptibility to colds prior to treatment, colds experienced after treatment and reactions noted. Most of the reactions were mild and transitory and caused the workers no real inconvenience.

The results of this study indicate that this form of oral vaccination against the common cold is safe and effective, and warrants wide extension in the industrial field. The great saving to industry in regular employee attendance and efficiency, as well as the value to the individual worker by the effective prevention and treatment of the common cold, is emphasized.

* Catarrhal Oravax Tablets, The Wm. S. Merrell Company, Cincinnati.

TABLE I.
PROPHYLAXIS OF THE COMMON COLD WITH CATARRHAL ORAVAX TABLETS
Tennessee Copper Company, Smelter Department

Worker	Usual Annual Susceptibility to Colds	Colds Experienced the Winter Following Prophylaxis
M.C.D.	1	1—"light"
J.J.S.	5	1—"light"
W.S.P.	3	1—"light"
S.H.	4	1
F.M.W.	4	0
A.L.C.	0	0
T.W.O.	1	0
C.L.S.	Chronic	1
E.W.H.	3	0
L.T.	1	0
L.W.B.	1	0
W.H.R.	3	0
R.R.B.	1	0
T.P.D.	2	0
O.W.	3	1—"light"
S.E.J.	Chronic	1—"light"
R.G.G.	2	1—"light"
T.H.W.	2	0
W.L.V.	3	0
A.F.P.	3	1
L.H.P.	4	1
G.H.H.	4	0
M.C.P.	5	2
D.L.	0	1
A.F.J.	2	0
R.L.H.	2	0
W.L.F.	3	2
T.M.P.	2	0
C.A.B.	1	0
J.H.P.	0	1
E.M.	2	0
L.E.C.	2	0
F.A.T.	5	2
C.H.	2	1
R.P.	3	0
L.W.	6	0
C.I.P.	2	0
E.F.C.	3	1

Current Comment

EMERY R. HAYHURST, M.D.,
Columbus, Ohio

—Disabling Morbidity in Soap Industry—

"DISABLING Morbidity among Employees in the Soap Industry," 1930-34, by HUGH P. BRINTON, Associate Satistician, and HARRY E. SEIFERT, Assistant Public Health Engineer, with assistance of DR. W. M. GAFAFER, U. S. Public Health Service, Washington, D. C., was released for publication July 21, 1939.

The supporting data for this report are drawn from material collected by the occupational morbidity and mortality study of the National Health

Survey, and encompass data transcribed from the sick benefit organization records of 10,833 members who were employed in 36 establishments, over a period of five years, 1930-34. Because, however, of changing membership there were at least 6,490 employees on the basis of continuous membership for an average of 36 months. Since the months of membership for the employees, other than white, were too small to be used for statistical purposes, the present analysis is based on the experience of white males and females. The total number of cases of disability during this period was 2,565—males 2,129, females 429, colored males seven. The total number of deaths was 89 (all whites)—males 84, females five.

The authors' summary says: "This report deals with sickness and non-industrial injuries causing disability lasting eight calendar days or longer among persons engaged in the soap industry. The annual number of cases per 1,000 was 76.0 for males and 98.1 for females, while the annual number of days of disability per person was 2.70 and 3.41 respectively. The average number of days per case was 35.5 among males and 34.8 among females.

"Age-standardized frequency rates by occupation among males ranged from 31.8 for office workers to 134.9 for soap handlers and process laborers. High rates were associated with strenuous manual labor, and low rates with white collar and supervisory occupations. In some occupations certain diagnosis groups showed rates much above the average for all occupations.

"According to socio-economic class for males, clerks and salesmen had the lowest frequency rate, followed in order of increasing magnitude by skilled workers and foremen, semi-skilled workers in manufacturing, and unskilled workers. Similarly, with respect to females, semi-skilled workers in manufacturing showed a higher frequency rate than clerks."

Membership in the sick benefit organization is compulsory, but excludes employees with initial salaries of $3,600 per year or over. There are no age limits for applicants for membership, but a physical examination is required. Benefits are refused for disabilities connected with the improper use of stimulants or narcotics, "immoral practices," venereal diseases, voluntary self-injury, unlawful acts, fighting, and maternity. There is a waiting period of seven days before payments are begun. Payments amount to two-thirds of the weekly wage for a maximum period of 52 weeks in any one year; thereafter reduced payments are continuous.

Hence the present analysis is based only on those disabilities associated with membership in the sick benefit organization. Only disabilities which began during the study period and lasted eight calendar days or longer were considered as cases. However, all days of disability occurring during the study period were considered as days' disability.

Occupations were arranged into 11 groups for white males and three groups for white females. For both sexes, office workers included members in similar environments and not presumably subjected to exposures in the plant. The 11 male groups comprised office workers, salesmen, foremen, process operators, soap handlers and process laborers (not elsewhere classified), packing machine operators, packing laborers, warehouse laborers, maintenance workers, laborers (n. e. c.), and "all others." The white females comprised office workers, packing machine operators, and "all others."[1]

Process operators (males only) include mainly semi-skilled workers engaged in making soap and using a large variety of materials, for example, fats, oils, lye, sal soda, glycerine, and "products." Normally these workers are not exposed to such materials since most of the processes are enclosed. *Soap handlers and process workers* are subjected to strenuous work. *Process laborers* include equipment cleaners. *Packing machine operators* include both male and female workers who handle the finished soap. *Warehouse laborers* also do strenuous work but presumably are not subjected to exposure in the plant. *Laborers* (not elsewhere classified) are not homogeneous in the type of work or exposure and may work inside or outside the plant; their only common characteristic is the fact that they are unskilled.

In frequency of sickness, males showed a marked increase with age for certain specific diagnoses—rheumatic diseases increasing more than 29 times, skin diseases 16 times, circulatory diseases 12 times. Respiratory and digestive diseases did not fluctuate greatly until the oldest age group was reached. Infectious and parasitic diseases showed the greater frequency in the younger. Diseases of the pharynx, tonsils, and appendicitis were less common in the older. Females showed a pronounced rise in age for non-industrial injuries, circulatory and skin diseases, but a sharp decrease for respiratory disease, appendicitis, and infections and parasitic diseases. Notable was the decline for respiratory diseases in older females and failure of the rheumatic rate to show a rapid increase with age. For males, pneumonia and hernia were higher among both young and old. Indeed, no cases of hernia were reported among females.

FROM the point of view of the four principal diagnosis groups (respiratory, digestive, non-respiratory—non-digestive, and ill-defined or unknown), the position of females was most unfavorable for digestive diseases, with an excess of 55%, while the respiratory diseases showed an excess of 45%, and non-respiratory—non-digestive 21%, but they showed less non-industrial injuries than males. The fact that maternity cases were not eligible for sick benefits should be kept in mind.

For disability by occupation: (1) Males,—*soap handlers and process laborers* led the list for

1. The figures do not show the average or mean number engaged in any specific occupation, but the leading male occupations, given by person-years show, in decreasing order (we cite the first four only): Maintenance workers, salesmen, office workers, and process workers; similarly for the three female groups—office workers, packing machine operators, and "all others."

the annual number of cases per 1,000 persons (134.9 standardized) and stood second to *laborers (n.e.c.)* for annual number of days disability per person (4.11 and 4.35 respectively), but *foremen* lead the list for the average number of days per case (41.6); (2) Females,—*packing machine operators* had the greatest annual number of cases per 1,000 persons (117.1, standardized), as against 74.5 for *office workers*, and, for annual number of days per person, stood 5.26 and 2.35, respectively.

Frequency of disabilities by occupation, age, and broad diagnosis groups are detailed in a two-fold age division — those under 35 and those 35 and over. Significant rates by socio-economic class are referred to in the Authors' Summary above. Seven references accompany, five to other recent studies by the Service, one to the 1930 Census on Occupations, and one to Thomssen and Kemp's "Modern Soap Making" (1937).

—*Ohio Industrial Hygiene Bulletin*—

BEGINNING with April, 1939, as Vol. 1, No. 1, the Bureau of Occupational Diseases of the Ohio Department of Health, Columbus, published its first monthly bulletin which comprises a compact single sheet, printed on both sides. The necessity for such a publication in a state where almost a million persons are employed in the heavy industries seems warranted as an official medium of dissemination of educational material.

The Bulletin describes the staff and laboratory facilities, as enlarged (in 1936) to include six technical members—three physicians, two engineers, and a chemist — and a special occupational disease laboratory; also a mobile (auto-truck) industrial laboratory equipped with standard x-ray apparatus and a small chemical and examining room. The first teleo-roentgenograms were made in this mobile laboratory on September 21, 1937.

The laws in Ohio under which the Bureau operates are briefly synopsized, especially in relation to the occupational disease reporting law and the matter of the privileged character of reports made under it by which the intelligence contained cannot be used in any litigation. (This law was enacted in 1913.) The Bureau holds itself aloof from compensation and court cases and operates strictly impartially as a fact-finding body. Advice and cooperation rather than force or coercion has been the policy of the Bureau.

From the date of the first report of an occupational disease, May 15, 1913, approximately 23,409 cases have been reported. Carbon monoxide mishaps are separate, also acute mishaps and accidents. A reporting fee has never been paid to physicians, as has been done in some States. In spite of this, Ohio has always had more cases reported each year than any other State, and on occasions has received more reports than all other States combined. The reporting form is described, and mention made of supplementary information requested in lead poisoning and pneumoconiosis.

Three individual official bodies in Ohio deal with the worker's health and safety. In addition to the present Bureau, whose chief functions and duties are synopsized, there is the Division of Workshops and Factories and the Division of Safety and Hygiene, the latter under the Industrial Commission. Each body has separate and individual duties and functions.

A brief preliminary statement is made for the state-wide industrial hygiene survey, the field work of which has been recently completed, covering approximately 3,000 establishments with a population of over 300,000 workers and representing about one-third of all establishments in the mining, manufacturing and mechanical groups as well as laundries and dry cleaning. The finished work will approximate 400 pages and contain historical notes, laws, more than 200 tables, and will be illustrated.

New Books

Review by
JAMES T. CASE, M.D., F.A.C.S.,
Chicago

TEXTBOOK OF GENERAL SURGERY. By WARREN H. COLE, M.D., F.A.C.S., Professor of Surgery, University of Illinois College of Medicine; formerly Associate Professor of Surgery, Washington University School of Medicine, St. Louis, and ROBERT ELMAN, M.D., Associate Professor of Surgery, Washington University School of Medicine, St. Louis. Second Edition. New York and London: D. Appleton-Century Company, Inc.

THIS, the second, edition is no larger than the previous text, but the revision has been thorough, new text replacing old. It is apparent that the authors have adhered to their original intention of including only what they considered as the most important details of general surgery in such a way as to benefit both the practicing surgeon and the medical student.

Sulphanilamide therapy has so many and important applications in various infections that it is often referred to. Some of the newer advances dealt with in the revision include the prevention and treatment of bleeding in jaundice by vitamin K; a discussion of the hepato-pancreatic-syndrome. New advances in our knowledge of pulmonary neoplasms are recorded, as also intestinal obstruction treatment by decompression therapy. New progress in the treatment of actinomycosis by surgery and irradiation therapy is included.

It is interesting to note the simplification and coordination of the present knowledge of the common types of hernia. Other additions include postoperative complications, hemorrhage following thyroidectomy; the importance of hypoproteinemia and salt edema; new knowledge of liver function tests; recent contributions to the pathogenesis of cholecystitis and the formation of gall-stones. The authors display a definite shift toward a more conservative attitude in the operative treatment of acute pancreatic necrosis and of general peritonitis produced by perforated appendicitis.

The above are only the most important revisions which are included in the new edition. As in the previous volume, the authors have felt that the fund of surgical knowledge is too vast to permit inclusion of a discussion of surgical diagnosis and adequate detailed operative data in one volume. Consequently they have limited the discussions of operative technic to a few of the more common types of operations.

The book is deservedly popular, as attested by this early opportunity for a revised edition, an opportunity which the authors have embraced very creditably.

Fourth Silicosis Symposium

— Abstracts of Proceedings of the Fourth Meeting at Saranac Lake, N. Y., June 19-23, 1939 —

THE Fourth Silicosis Symposium, given in connection with the Trudeau School of Tuberculosis, at the Saranac Laboratory, Saranac Lake, N. Y., was held June 19-23, 1939, DR. L. U. GARDNER, Director of the Saranac Laboratory, presiding.

The Symposium covered a broader scope than the former meetings, including medical and engineering phases of silicosis generally, followed by results of studies of various types, and concluding with the discussion of the administrative, insurance and compensation aspects of the subject.

The Program was as follows:

Monday, June 19

MORNING: Introduction, DR. L. U. GARDNER, Saranac Laboratory.

Summaries with Discussion: "Etiology," MR. D. E. CUMMINGS, Saranac Laboratory; "Dust Counting and Analysis," PROFESSOR PHILIP DRINKER, Harvard University; "Pathologic Anatomy," DR. L. U. GARDNER.

MONDAY AFTERNOON

"Pathologic Physiology," DR. W. S. MCCANN, University of Rochester; "Clinical Picture," DR. A. R. RIDDELL, Ontario Department of Health; "Roentgenology," DR. E. P. PENDERGRASS, University of Pennsylvania.

Tuesday, June 20

MORNING: "Disability, Its Causes and Clinical Evaluation," DR. W. S. MCCANN.

Average Industrial Worker: "The Industrial Clinic and Its Functions," DR. A. G. KAMMER, Medical Director, Inland Steel Co.; "Incidental Pathological Findings," DR. A. J. VORWALD, Saranac Laboratory.

Reaction to Inert Dusts: "Typical Pathologic Picture of Linear Exaggeration," DR. L. U. GARDNER; "Roentgenologic Appearance in Linear Exaggeration," DR. H. L. SAMPSON, Trudeau Sanatorium.

AFTERNOON: *Results of Surveys:*

Mining in Dolomite:

"Atmospheric Conditions," PROFESSOR PHILIP DRINKER.

"Clinical Picture and X-Ray Findings," DR. H. M. ROEBBER, Bonne Terre, Missouri.

Gypsum Industry:

"Atmospheric Conditions," MR. T. M. DURKAN, Saranac Laboratory.

"Clinical Picture and X-Ray Findings," DR. D. M. BRUMFIEL, Saranac Lake, N. Y., and DR. H. L. SAMPSON.

Cement Industry:

"Atmospheric Conditions," MR. T. M. DURKAN.

"Clinical Picture and X-Ray Findings," DR. D. M. BRUMFIEL and DR. H. L. SAMPSON.

Wednesday, June 21

MORNING: *Classical Silicosis:* Picher — Previous to 1932: "Atmospheric Conditions," MR. D. E. CUMMINGS; "Clinical Picture," DR. A. J. LANZA, Metropolitan Life Insurance Company; "X-Ray Findings," DR. R. R. SAYERS, U. S. Public Health Service; "Pathology," DR. L. U. GARDNER; "Mortality," MR. D. E. CUMMINGS.

AFTERNOON: "Clinical and Roentgenologic Survey in Individuals Working in a Pure Silica Industry," DR. E. P. PENDERGRASS.

Rapidly Developing Silicosis: Sandblaster:

"Clinical, X-Ray and Pathological Findings," DR. H. L. SAMPSON and DR. L. U. GARDNER.

Thursday, June 22

MORNING: *Reaction to Mixed Dusts:* Cement Industry — Raw Mills: "Atmospheric Conditions, X-Ray Findings," DR. L. U. GARDNER.

"Ontario Gold Mining — Variations with Content of Free Silica and Individual Mine Dusts," DR. A. R. RIDDELL.

Iron Ore Mining:

"Atmospheric Conditions," MR. D. E. CUMMINGS.

"Clinical Picture and X-Ray Findings," DR. L. E. HAMLIN, Pennsylvania Mining Company, Norway, Michigan.

DISCUSSION, DR. H. F. RINGO, Montreal Mining Co., Montreal, Wisconsin, and DR. D. C. PIERPONT, Ironwood, Michigan.

AFTERNOON:

Foundry Industry:

"Atmospheric Conditions," MR. T. HATCH, New York State Department of Labor.

"Clinical Picture and X-Ray Findings," DR. O. A. SANDER, Milwaukee, Wisconsin.

Hard Coal Mining:

"Atmospheric and Clinical Findings," DR. R. R. SAYERS.

Friday, June 23

MORNING: "Administration of Program of Prevention," DR. C. D. SELBY, Medical Consultant, General Motors Corporation.

"Environmental Control in Program of Prevention," D. E. CUMMINGS.

"An Employer's Viewpoint," MR. A. FLETCHER, St. Joseph Lead Co.

AFTERNOON:

"Functions of the State in Control," MR. M. BOWDITCH, Massachusetts Department of Labor and Industries.

"The Insurance Carrier," DR. A. J. LANZA.

"Legislation: Formulation," MR. T. C. WATERS, Occupational Disease Commission, Baltimore, Maryland.

"Legislation: Administration," MR. V. WRABETZ, Chairman, Wisconsin State Industrial Commission.

First Day

DR. L. U. GARDNER in making the introductory remarks, stated that not all the problems brought up at the first silicosis symposium in 1934 have yet been solved. Much useful knowledge has been developed on the diagnosis and control of silicosis, however, and great progress has been made in its prevention through the intelligent application of this information.

MR. DONALD E. CUMMINGS, in discussing the etiology of classical silicosis emphasized the fact that there is no silicosis without the presence of uncombined silica dust. The hazard is a function of (1) individual susceptibility and (2) degree of exposure. Individual susceptibility is influenced by (1) anatomical peculiarities in respiratory mechanisms, (2) physiological response, (3) previous exposure, (4) chronic pulmonary infection or other pathological processes, (5) age, (6) nationality, (7) general health, and (8) ability to cooperate intelligently. The degree of exposure is affected by (1) character of the dust, composition, size, and concentration; (2) duration of exposure; and (3) general working conditions. Two levels were suggested — the primary threshold, for example, five million particles of free silica per cubic foot of air, below which we could reasonably expect freedom from development of silicosis; and the secondary threshold for pure quartz at a level of not higher than 10 million particles per cubic foot of air, and above which concentration it should be considered that men of normal susceptibility would in time develop silicosis.

PROFESSOR PHILIP DRINKER gave a general outline of methods for counting and analysis of dust. Whether studying pollution of air or of water, we desire a method of measuring the degree of pollution. The method of counting impinger dust samples as described by WILLIAMS was recommended highly as correlating the results obtained by the standard method of the U. S. Public Health Service. It was suggested that the significance of dust counts be explained to all interested superintendents, foremen, and laborers — that the results be posted and the management and workers be encouraged to reduce concentrations as far as possible. Such dissemination of information makes good defense for medical and legal phases of the problem and shows the good faith of the employer. It is desirable to have a simple and short-cut routine procedure for the determination of percentage of free silica, which can be checked occasionally by the more laborious exact method.

DR. L. U. GARDNER, in discussing the pathologic anatomy of silicosis and other pneumoconioses, stated that all dusts except free silica and asbestos give non-specific reactions, and such inflammation as may occur, does not interfere with the function of the lungs. There is no evidence that non-siliceous dusts cause extension of tuberculosis — linear exaggeration due to pigmentation does not lead to silicosis — and such linear exaggerations produced by non-siliceous dusts do not progress to nodulation. Silicosis causes increased susceptibility to tuberculosis, which is largely responsible for the marked dyspnea and other characteristic symptoms associated with silicosis. When nodules lose their characteristic outlines and become conglomerate masses, it is believed that tuberculous infection has occurred. It has been impossible to obtain protective action with metallic aluminum dust in experiments at the Saranac Laboratory; with the use of aluminum hydroxide, however, the development of silicosis has been inhibited for a period of one year, the duration of the present experiments.

In discussing DR. GARDNER'S presentation, DR. E. J. KING, now at the London Postgraduate Hospital, and formerly of the Banting Institute at Toronto, stated that the thermal precipitator is widely used at present in England for dust determinations, and x-ray diffraction is extensively used in analysis for free silica content. It has been found that aluminum metal has the greatest effect as a depressor of the solubility of free silica, of any substances so far tested.

DR. A. J. LANZA thought that a brilliant piece of laboratory work has been conducted on aluminum at Toronto; it is believed, however, that true prevention is doing away with the hazard at the point of origin.

DR. A. R. RIDDELL presented the clinical picture of silicosis. History of exposure, x-ray, physical examination, and laboratory examination are all important to the diagnosis. There are two clinical types of silicosis: (a) simple, and (b) infected (of which tuberculosis is outstanding). The following symptoms were found in a group of 637 silicotics: 90% with limited expansion of chest (less than 2 inches); 60% with expansion of less than 1½ inches; 72.5% with changed breath sounds; 39% with prolonged expiration; 15% with short inspiration; 60% with adventitious sounds; 51% with impaired note; 15.5% with clubbed fingers; 13.5% with curved nails (75% of these last two groups had positive sputum or had died with tuberculosis); 6% with cyanosis; 16.5% with cardiac enlargement; 34.5% with positive sputum (220 positive; and 35% fatals (222). It was suggested that it was not sufficient to rely on just one sputum test; repeated sputum tests should be made. Of the 222 fatals, causes of death reported were as follows: 165 pulmonary tuberculosis; 27 cardiovascular disease; eight bronchogenic carcinoma; seven bronchopneumonia; four lobar pneumonia; three unknown (probably tuberculosis); three pulmonary infarct and thrombosis. Other causes accounted for small numbers of cases.

DR. E. P. PENDERGRASS presented a comprehensive paper on the roentgenologic aspects of the normal and the silicotic lung, and described the shadows of structures to be considered and evaluated. He pointed out that thickening of the visceral pleura causes increased densities that simulate a lung lesion, and that vascular structures may produce shadows simulating thoracic calcium or

* In *J. Indust. Hyg. & Toxicol.*, June, 1939.

beading. Descriptions were given of enlarged hilum shadows, beading, nodulation, conglomerate shadows and massive shadows. A large number of roentgenograms was shown to illustrate all phases of this discussion.

Second Day

DR. W. S. McCANN combined his papers on pathological physiology, and disability (its causes and clinical evaluation), giving both on Tuesday morning. The absolute interdependence of pulmonary and circulatory functions of the lungs was emphasized as the basis for complete understanding of the pathologic physiology of silicosis. Orthopnea does not occur in silicosis or in pneumonias. Pneumotachlograms in the study of pulmonary diseases might be of as much aid as the electrocardiagram in heart conditions. Residual air measurements may be used as a relative index of the extent of pathologic conditions. The vital capacity or the residual index is a better measurment than the ratio of the area of the lung at maximum inspiration and expiration. There is no correlation with chest expansion. We do not have accurate means of determining the degree of hypertrophy of the left ventricle. Measurements of circulating velocity mean little.

DR. A. G. KAMMER discussed the industrial clinic and its functions, giving the results of a health survey made at the Inland Steel plant in 1936 and 1937. Lantern slides were used to show the forms used in the survey, and giving the significant findings in 10,000 consecutive physical examinations; comparison was made with a similar group of examinations reported by the U. S. Public Health Service in 1926. Syphilis was found by positive serological tests in 4.8% of those examined, the positive cases being recalled to the plant clinic every three months for the checking of this condition; copies of the results of the tests were sent to the private physician in each instance. Only between 10 and 20% of the cases of tuberculosis were detected by ordinary clinical examination without x-ray. In conclusion, it was stated that the industrial medical clinic should (1) conduct examinations to determine the status of the worker's health and give recommendations for improvement; (2) diagnose disease; (3) establish standards of examinations and interpretation of them; (4) follow up disease conditions.

In discussing DR. KAMMER'S paper, DR. T. LYLE HAZLETT thought that perhaps the figures at Inland Steel might not be strictly representative, because of the young-age group in comparison with Westinghouse and other large industries. It is desirable to have the examining physicians know about the jobs in the plant, through the personnel department making job analyses available to the physicians. In conducting periodic examinations, it is necessary to sell the desirability of the procedure to management and, even more so, to employees, especially in the age-group over 40 to 50 years.

DR. W. IRVING CLARK, in discussing the same paper, noted that in a recent tuberculosis survey in The Norton Company, 1.7% of the employees had inactive tuberculosis as shown by x-ray. It is believed that if tuberculosis can be kept out, no problem will be presented by disability from silicosis. Clinical check-up should be made every six months on inactive cases, as shown by x-ray, but repeated x-rays every six months may not be necessary.

DR. A. J. VORWALD, in presenting incidental pathological findings in the average industrial worker, mentioned important conditions that show on the x-ray other than those caused by dust: (1) pleural adhesions; (2) fibrous scars on the pleura, usually at the apex; (3) the primary complex; (4) chronic bronchitis, especially in the older age groups; (5) primary bronchial carcinoma; (6) emphysema; (7) atelectasis; and (8) thickening of the walls of the blood vessels. It is important to keep these conditions in mind when examining x-rays of workers in dusty operations.

DR. L. U. GARDNER, in discussing the typical picture of linear exaggeration as the reaction to inert dusts, believed that it is not to be assumed that, because the x-rays do show some changes, they are necessarily produced by dust in environment. Autopsy material is needed in greater quantity, and occupational histories are all too inadequate. The technique of animal experiments was briefly described, with reference to the effect of pure free silica and silicate dusts; with the latter, there is slight evidence of chronic infiltration and inflammation — not going over to fibrosis — and, after cessation to exposure, the condition becomes retrogressive rather than progressive. We should avoid the assumption that the presence of other dusts than free silica in pulmonary scars causes such scars; we should proceed with great caution and have more pathological basis for interpretation of many of our findings as shown on the roentgenogram.

DR. H. L. SAMPSON, in describing roentgenological appearances in linear exaggerations, stated that such roentgenological appearances do not mean silicosis. With good modern technique, we may expect to see linear markings reaching to the periphery, such as were only previously obtained where pathological conditions were in effect. Linear exaggerations even at the base of the lungs may be produced by upper respiratory infection, by chronic bronchitis, thickening of blood vessels, bronchiectasis, and by age; and, at times, there is no explanation. Pigmentation itself may cause a change in the x-ray pattern.

PROFESSOR PHILIP DRINKER gave the results of surveys relative to atmospheric conditions in mining in dolomite rock. Analyses have shown 3% free silica in the rock and 1% free silica in the air. Drilling at the rate of 12 inches per minute, as against three and four inches per minute in trap rock, and two and three inches a minute in granite, tends to increase dust concentrations. There was no silicosis hazard. In one of the mines of the same company sandstone was encountered, but here the dust concentration was kept below five million particles per cubic foot of air. It was believed that the working conditions were exceptionally good, since temperature, relative humidity and dust conditions were for the most part kept well within the comfort range.

DR. H. M. ROEBBER spoke on the clinical picture and x-ray findings of men working in these mines. There have been no evidences of unusual lung pathology among men who have been drilling as much as 28 to 29 years. One employee who had been drilling for 37 years had showed a marked improvement in his x-ray picture during the past 20 years.

MR. T. M. DURKAN presented material regarding atmospheric conditions in the gypsum industry. In the mines, the usual dust counts vary from one to 10 million particles per cubic foot by light field. Impure varieties of gypsum may contain as high as 3% to 4% free silica, but most have very low percentages or none. Certain types of sanded plaster may run as high as 50% quartz and it was formerly thought that this would present a severe hazard, but such was shown not to be the case; for instance, in one plant, where the quartz in the plaster ran as high as 50%, the air floated dust showed only 1% to 2% quartz. Lack of development of silicosis in the sanded plaster department is attributed partly to the large grain size of silica used. It has been shown that gypsum settles more rapidly than quartz and that a mixture of the two settles even more rapidly.

DR. D. M. BRUMFIEL, presenting the subject of clinical picture and x-ray findings in the gypsum industry, mentioned the survey made in 1932 which included 100 men who were the most severely exposed in two New York State plants. None of these had worked less than five years. Later on, 17 men were examined who had been working in buhrstone dressing and in sanded plaster mix departments. In conclusion, it was stated that gypsum dust was shown to be harmless in itself, had protective power against other dusts largely by causing agglomeration in the air, and does not predispose to tuberculosis nor reactive latent tuberculosis.

DR. H. L. SAMPSON, in speaking of the x-ray findings of the 100 workers in the gypsum industry, stated that there had been no changes in the x-ray findings comparing the 1934 and 1939 films.

MR. T. M. DURKAN, in speaking of the atmospheric conditions in the cement industry, summarized the dust concentrations and the free silica percentages which were found. It was concluded that total dust concentrations of less than one million to more than 1900 million particles per cubic foot of air did not produce significant amounts of pneumoconiosis. In the raw mills where raw material might contain from 1% to 60% of free silica there was practically no silicosis. Its absence was explained partly by the large size of the quartz particles and partly by the protective action of clay.

DR. D. M. BRUMFIEL, in discussing the clinical picture and x-ray findings in the cement industry, stated that 17 plants were included in the engineering studies; 11 plants had conducted clinical studies on a total of 2278 men, all of whose x-rays had been referred to the Saranac Laboratory for interpretation. These plants formed a group representative of the entire industry.

Turnover is low in the cement industry, 214 of the workers having experienced more than 26 years' exposure. No abnormalities were found which could be considered to be produced by finished cement dust, as shown by the clinical examinations. Of the 2278 x-ray films, only eight showed nodulation—six of these were known to have had previous mining experience. One worked only in the cement industry, but he was a driller in a sandstone pit where he was exposed to 60% free silica dust over a period of years. The remaining employee had been exposed to cement plant dusts alone. He worked in a raw mill where sandstone was occasionally ground, and 20 years before he had a severe crushing accident to his head and face. It was suggested that the injury in his nasal passages may have been a factor. Eight cases, or 0.35%, had possible active tuberculosis, considerably less than the rate for the general population. The complete report will be available soon. In conclusion, it was stated that finished cement dust was harmless; that dust from raw materials rarely produced significant reaction; and that neither the raw nor the finished materials had reactivated previous tuberculosis lesions.

DR. L. U. GARDNER commented that U. S. Public Health Service Bulletin No. 176 concerning the health of workers in a cement plant (published in 1927) did not depict conditions in the cement industry as a whole, since the observations were limited to one plant and other plants used somewhat different processes. Furthermore, the study included only four men employed for more than 20 years. X-rays were taken on only a few selected men. Much of the report was taken up with absenteeism.

Third Day

MR. DONALD E. CUMMINGS presented data on atmospheric conditions at the Picher lead mines previous to 1932 and recently. In 1923, after there had been some dust control established, 31 impinger samples showed an average dust concentration of 327 million particles per cubic foot of air. It is believed that prior to this date the dust concentrations were of the order of 1000 million particles per cubic foot of air, as shown by calculations from sugar-tube samples taken early in 1923. Approximately 900 dust determinations of more recent date have shown that 75% of these contained less than five million particles and none over 30 million particles per cubic foot of air in the mines. In the mills, 30% of the determinations showed less than five million particles and only 14% were higher than 30 million particles. The dust runs 99% free silica and is made up of chert and flint.

DR. A. J. LANZA, in speaking of the clinical picture of classical silicosis at Picher, stated that from 60,000 to 80,000 physical examinations have been made on 27,000 men and that the symptomatology was similar to that discussed by DR. RIDDELL in a previous paper. Employees caught colds easily even though they appeared to be in good health; later the coughs became productive, but hemorr-

hages were infrequent. Loss of weight was common, and there were occasional night sweats and progressive weakness. When tuberculosis became superimposed on silicosis, the men continued to work within a few weeks or even a few days of death. Although repeated examinations were made, tubercle bacilli were difficult to find in the sputum; ordinarily tubercle bacilli appeared a few days before death. It was believed that a man did not become dyspneic until he had developed tuberculosis. The intensity of the exposure corresponds to the intensity of the clinical picture. In other areas, such as Butte for instance, there was much less silica and the clinical picture was much less severe.

Dr. R. R. Sayers, discussing the x-ray findings of the Picher group, showed lantern slides of x-rays of the men in this district, comparing x-rays and symptomatology with those of men in other dust exposures, such as anthracite mining, talc, and granite.

Dr. L. U. Gardner, presenting the pathology, stated that he had seen little pathological material from the Picher district, and emphasized the desirability of having such material to support and verify all radiographic interpretations. The previous statement of Landa was corroborated, to the effect that the presence of conglomerate masses in the x-ray is indicative of tuberculosis infection even if no bacilli can be found.

Mr. D. E. Cummings presented mortality figures for Ottawa County, Oklahoma, which included the Picher district, and made comparison of these with the Oklahoma rates and those of the United States registration area. The highest rates ever recorded were found in male miners in the lead and zinc mines of Ottawa County, Oklahoma, showing a rate of 6000 and above per 100,000 persons at age 45. No great amount of tuberculosis was found among the families of the miners, due probably to the fact that tubercle bacilli were released only shortly before death. In the 1937 study it was demonstrated that there was no appreciable increase in tuberculosis among workers with normal degrees of linear exaggeration, although 30 out of 100 men with silicosis developed tuberculosis.

In the discussion which followed, it was stated that climate exerted a great influence in the development of tuberculosis, regardless of occupation or economic status. Simple silicosis progresses somewhat if the man is removed from the hazard, but in a series of several hundred simple silicosis cases observed over a period of years by Dr. Sampson, only a few apparently progressed. The incidence of change was quoted as being 0.2% per year per man in the iron mines under controlled conditions. Progression is a factor in disability only when there is infection present. Dr. Sayers believed that if silicosis is produced rapidly from excessive amount of quartz dust, the condition will tend to develop more rapidly than if the process has been slow; it is recommended that the man not be removed from his occupation, but that the hazardous condition be corrected.

Mr. E. D. J. Urban presented data regarding atmospheric conditions in the granite industry at Barre, Vermont. A number of excellent lantern slides were shown, depicting operating conditions and dust control methods. A great deal of work has been done during the past two years, and it is evident that the more than $100,000 spent in this period in dust control in the Barre area has been applied to good advantage.

Dr. L. E. Judd, in giving the clinical and x-ray findings of the experience at Barre, Vermont, compared the results of examinations of 850 men x-rayed in March, 1937 with a group of 350 who were again x-rayed during the past three months. Cough, dyspnea and chest pain were found to an increasing extent as the degree of fibrosis and silicosis developed. Two groups were cited of the 500 men exposed — those exposed to concentrations varying from 30 to 60 million particles per cubic foot of air, and those exposed to less than 10 million particles. In the high dust group, 18% had simple silicosis — 8% silicosis with probable infection—and 18% silicosis with tuberculosis. In the low exposure group, 2% had simple silicosis and 2% silico-tuberculosis. It was estimated that there are at the present time about 200 workers in the Barre area with silicosis and about 300 with silicosis plus infection. Assuming that there is adequate dust control, there should now be no new silicosis cases after two or three years, and progression should not develop appreciably, without infection. It was concluded that uncomplicated silicosis is not a progressive disease and that dust control will prevent most or all reactivation cases.

Dr. R. R. Sayers, in speaking of mortality in the Barre, Vermont group, stated that there was 14 times the death rate from tuberculosis among stone-cutters than among adult males in the U. S. registration area. Prior to the introduction of pneumatic tools in 1892, the annual death rate per thousand granite cutters in 1890 was 1.5 per thousand; in 1926, 14.7 and in 1936, 19.5. The tuberculosis rates can be expected to continue upward for awhile; the pneumonia rate is more than twice the normal and the bronchitis rate is also high.

In the discussion, Dr. Gardner noted the difference between the non-fibrous reaction when animals are injected with granite dust, as compared with the severe reaction when an equivalent quantity of quartz in pure state is introduced. It is not known whether the inhibiting action is due to the presence of feldspar and mica, or possibly the aluminum in the minerals. In iron mines, Dr. Pierpont's statistics indicate that the presence of pneumonia is no different as between the silicotics and the non-silicotics. This conclusion was concurred in by Riddell. Cummings noted that the pneumonia rate in foundrymen is definitely excessive.

DR. E. P. PENDERGRASS reported on a clinical and roentgenological survey of 329 individuals working in a pure silica industry, involving screening, milling, and bagging operations.

No dust determinations had been made (though

there has been marked improvement in dust conditions during the past several years) but x-rays were taken three years prior to the group of x-rays just completed; and where infection was suspected, the sedimentation test and sputum test were made. All the 41 workers in one plant were found to have healthy chests, although one-fourth of them had been in the exposure for 15 years or more. In another 22%, and in a third 25% showed some abnormalities. The sedimentation rate was abnormal in 17 of the second group cases diagnosed by x-ray as silicosis with healed infection. (Pendergrass so far has not been able to place much reliance in this test.) As to progression, in the third group exposed to minimum dust concentrations, three were stabilized, two regressed, and none progressed. Of those exposed to average concentrations, one was stabilized, two regressed, none progressed; and of those exposed to maximum concentrations, 13 were stabilized, seven regressed, and two progressed. Workmen with lesions and infection should not be told they are doomed, since some of these infections may become quiescent and permit the man to work again. Where there is no lung infection, it is believed that there is no significant pathological condition. It is suggested that we might even use a two-fold classification: (1) silicosis with quiescent infection and (2) silicosis with active infection.

Dr. L. U. Gardner, in presenting the subject of "rapidly developing silicosis," especially among sand-blasters, said the Geneva International Silicosis Conference had agreed to substitute this terminology for "acute silicosis." Rapidly developing silicosis" is due very largely to the excessive concentrations of extremely fine free silica particles. McCord's animal experiments have shown that the presence of alkalies should not affect the development of silicosis. Middleton reported that in scouring powder manufacturing the 14 fatal cases out of 59 workers in England in 1936 were attributable to tuberculosis. In reference to the Gauley Bridge cases, few of the films seen showed definite evidence of nodulation. Much tuberculosis was present. In reporting the pathological study of tissues in 10 lungs and in the the lungs of three others exposed to high free-silica-content dust for periods of 11 to 20 months, the pathologist could not see any nodules or anything that suggested silicosis, the conditions being mostly pneumonias and some tuberculosis.

Dr. H. L. Sampson closed the discussion on the subject, emphasizing the desirability of serial films and presented a number of such series as evidence of their value.

Fourth Day

DR. L. U. GARDNER, in discussing the reaction to mixed dusts, presented findings on animal experimentation in connection with a number of types of dusts, giving the histological and autopsy findings, the kinds of dusts, concentration, and percentage of free silica. Data of this type were also given for injection experiments. It was suggested that where there is more than 30% free silica one should assume that the condition is dangerous and keep the concentrations below five million particles, unless other limits are found to be permissible on the basis of study within the particular industry. Where the free silica content is less than 30%, it was suggested that the code limits should be based on empirical experience, examining the men employed in the industry in order to determine proper dust limits.

Dr. A. R. Riddell reviewed the history of gold mining operations in Ontario and silicosis control methods. A silicosis research committee composed of four technical men and one full-time mining engineer supervises methods of dust control and acts in a consulting capacity. Dust determinations are made by means of the konimeter. Dust control methods used are "dustless" drills, water sprays, water curtains, and water after blasting, together with ventilation. Data on dust counts and free silica percentages in various areas were presented with reference to the extent of development of silicosis in the same areas. The increase in injury to the lungs with increase in the proportion of free silica was much more rapid than arithmetical proportions.

Mr. D. E. Cummings summarized the experience with atmospheric conditions in the iron ore mining districts. Figures were given relative to the experience with 10,000 men under supervision over a six-year period with the x-rays having been classified by Dr. Sampson from year to year. Lantern slides were used showing photographs of conditions in the mines, and results of considerable number of impinger samples of dusts used as a basis for the control of the hazard. It is obvious that a great deal has been accomplished by reduction of exposures for the most part to less than 10 million particles per cubic foot.

Dr. L. E. Hamlin presented material in reference to the clinical picture and x-ray findings in certain mines in Michigan. Figures were given relative to x-rays and sputum tests over a six-year period, with a demonstration of a family chart where tuberculosis had infected numerous persons within the family. In every case where sputum was found positive, a positive diagnosis had previously been made by x-ray. Three series of chest roentgenograms were shown with definite progression without infection. A motion picture of activities at the mine included a picture of a man working in his garden after his silico-tuberculosis had become arrested through sanitarium treatment.

The discussion on this particular subject was concluded by Drs. H. F. Ringo and D. C. Pierpont. Most of the unsolicited complaints of dyspnea are of cardiac origin and not due to silicosis alone. It is considered that tuberculosis will always remain the greatest problem. No disability has been seen in uncomplicated silicosis; disability invariably means active tuberculosis. In an extensive epidemiological survey of the incidence of head and chest colds, half of the 46 men with recent colds

showed x-ray evidence of sinus disease. It was felt, however, that the frequency and duration of colds in the mining group reported upon was no greater than in other parts of the country.

MR. THEODORE HATCH spoke of a new factor in foundry dust exposures—the activity index—defined as the ratio of the building volume in cubic feet to the number of tons of castings per man per day. New York State foundries were divided into three groups—in foundries with good control, the median dust count was nine million particles per cubic foot of air—in foundries with fair dust control, the median was 25 million particles—and in those with poor control the median was 32 million particles. A graph indicated that where the activity index was high there was a greater tendency for the foundry to fall within the group having good dust conditions. The New York study indicates that good foundry practice has resulted in reducing the average dust concentrations to less than 15 million particles per cubic foot of air.

DR. O. A. SANDER presented material on clinical and x-ray findings in the foundry industry, based on his own work and publications of other workers in this field. In six years of serial x-ray films, no cases of progression of non-infected fibrosis or silicosis have been seen. Men should be taken off the job and placed in the sanitarium only if they have positive sputum and definite evidence of clinical activity. Where, however, cavity formation is shown on serial films, the worker is hospitalized regardless of the absence of positive sputum. Men are kept at work under controlled conditions even where there are conglomerate shadows of silico-tuberculosis without clinical activity. The silicosis hazard is considered to be of no great moment in the great majority of small ferrous and non-ferrous foundries. Simple silicosis is not disabling, and the prognosis in older workers seems to be generally good. Silico-tuberculosis is the only serious and disabling condition. An unusual case of the x-ray of a sand-blaster who probably had no infection, but who was so dyspneic that he could hardly walk across the room, was demonstrated; this condition was developed after an attack of influenza about a year ago and the man is now on full compensation. The removal of tuberculosis contacts from foundries has in all probability been one of the reasons for the lack of new tuberculosis cases in these groups.

DR. R. R. SAYERS reviewed the findings of the U. S. Public Health Service study in the hard coal mining industry. Where dust contains less than 5% free silica, exposure should not be greater than 15 million particles per cubic foot of air; with free silica percentages up to 13%, the limiting concentrations of dust should be 15 million particles; at a level of 35% free silica, below 10 million particles. All available means should be utilized for dust control and silicosis prevention; by no means should men with active tuberculosis be allowed to continue at work.

In the discussion of this group of subjects, DR. LEONARD GREENBURG commented that when tuberculosis complicates silicosis, a rapid decline occurs, but that there are very few such tuberculosis cases in the foundry industry. DR. GARDNER believed that further autopsy correlation is necessary relative to criteria in differentiating healed and active lesions in the presence of silicotic nodulation; we must not accept wholly the South African and Picher concepts of silicosis as being directly applicable to exposures in other areas and to other types of dust.

Fifth Day

DR. C. D. SELBY, presenting the subject of the administration of a program of prevention, emphasized that the physician himself should have complete knowledge of all means of prevention and should have available results of dust determinations to which workers are exposed, together with the duration of the exposures. The objective of the preventive program should be that the worker can pass a lifetime in the exposure regardless of individual susceptibility, without injurious effects. In making a preliminary plant survey, general observations should first be made, next plotting the location of workers exposed to dust. Dust determinations may be necessary even in obvious exposures to convince reluctant management, or to settle a questionable exposure, and management should be convinced of the necessity for control, not so much as to the means of control. All persons should be taken into the confidence of the physician and management. All workers are entitled to both pre-employment and periodic examinations, and x-ray and electrocardiographic examinations will assist in coming to valid conclusions. It is thought that if we have tuberculosis under control, we will have taken care of our dust problem. However, the essentials of the program are definite control of both dust and the physical condition of employees. The industrial physician must depend upon the results of industrial hygiene surveys just as he depends upon the findings of other specialists. The final solution will only be found in an enlightened medical profession.

MR. D. E. CUMMINGS, in discussing environmental control in the program of prevention, cited methods in use in the iron mines in Michigan and the results obtained by such methods. Emphasis was placed on the necessity for determination of the degree of exposure and methods of control of such exposures, such as ventilation, wet methods, protective equipment, and education of personnel in the solution of the problem.

As MR. H. FLETCHER pointed out, it has been amply demonstrated that management can attack the silicosis problem with vigor and effectiveness, purely from the point of profit and not from one entirely of altruism. By the correction of working conditions, labor turnover has been reduced from 250% in 1919 to 40% in 1923, to 5% in 1933, and 2% in 1938—a reduction in estimated cost of $250,000 per year as the result of the decrease in the previous excessive labor turnover. Although the law requires keeping the dust concentration

under 100 million particles, with 6% free silica in the dust, this group has been able to keep under 10 million particles. To do this, an effective method is to take dust counts regularly at specific points and to send the reports to the head office periodically as a means of stimulating a dust consciousness so that control measures will be promptly approved. There should be no compromise with unjust claims. It is of great importance to make current records of dust conditions and not wait until claims start to be reported. Improvements in working conditions are a profitable investment.

Mr. Manfred Bowditch, in presenting the subject of functions of the State in control, sketched the history of the Occupational Disease Bureau in Massachusetts and its experience as a consulting and investigating unit. With proper education, authorities have obtained far better results in the granite industry than were forthcoming as a result of mandatory orders.

Dr. A. J. Lanza, in discussing the viewpoint of the compensation insurance carrier, stated that the carrier does not satisfy its duties to its assured unless it has investigated the hazards and initiated preventive measures. In reference to the silicosis situation, insurance companies have arranged for courses of instruction for their personnel, and assisted in sponsoring research, and as a group are now affording first class occupational disease prevention service to their assureds.

Mr. T. C. Waters, in discussing the formulation of legislation, referred particularly to (1) state legislation; (2) medical boards; (3) bureaus of industrial hygiene; (4) important court decisions; and (5) better legislation. It is believed that compensation should not be given for partial disability in silicosis cases. Medical boards should have final decision on medical matters dealing with compensation cases, and the boards should be outside the jurisdiction of politics. The work of industrial hygiene bureaus in 30 states and three cities has become very effective. Administrators of code regulations should use common sense in formulating the regulations and applying them — they should not use absolute police powers. A number of important court decisions were briefly cited. With reference to Federal legislation, the occupational disease problem is primarily a state function and control measures should come under state jurisdiction. Federal legislation should therefore be discouraged and state legislation should be properly amended.

Mr. Voyta Wrabetz, speaking of the administration of legislation, cited the favorable experience of the Wisconsin Industrial Commission in effecting the prevention of silicosis, as well as the proper compensation of cases which have developed. In Wisconsin, the law penalizes an employer who institutes oppressive physical examinations, but there has not been a single case where this law has been invoked since its passage in 1933. Although abuse of physical examinations is not countenanced, the Industrial Commission believes that a physical examination is desirable where properly done—in fact, that any occupational disease program which does not include physical examinations is short-sighted and inhuman. In the last few years, there has been no compensation awarded on uncomplicated silicosis in Wisconsin. It is thought that Wisconsin is about 15 years ahead of many other states in silicosis control, this result having been obtained without undue cost to employers. It is furthermore believed that the majority of employers are well pleased with the law and its administration.

Dr. Gardner, in summarizing his impressions of the Symposium, stated that the varied experiences in different industries indicated two common errors:

1. The assumption that all silicosis must manifest itself clinically and pathologically in the same manner as the classical examples of South Africa and Picher.

2. The growing tendency to generalization from experience limited to one or two industrial exposures.

He stated that it is still obvious to most observers that:

1. Silicosis is caused by inhaling free silica dust although admitted that the disease may be modified by other factors peculiar to different localities.

2. Silicosis is associated with an abnormal frequency of tuberculosis, although the actual incidence varies in different localities and may be combated by accepted anti-tuberculosis measures.

3. Superimposed infection is a major case of disability.

The Symposium had indicated most pointedly that the degree of disability associated with different roentgenologic appearances is not necessarily the same in every industry. The evidence of the assembled experts was too well authenticated to be doubted.

Opinion had differed on the matter of progression of silicosis after cessation of exposure but all were agreed that in the presence of pulmonary infection the disease did progress.

There had been lively debate on the question of individual susceptibility. While all agreed on its existence, some were of the opinion that it was due to variation in inherent capacities of tissues to react to silica while others believed that it was an acquired characteristic resulting from infection or anatomic peculiarities of the respiratory tract.

Evidence had been presented to indicate that mild degrees of linear exaggeration (P_1) in pulmonary roentgenograms were of little or no diagnostic significance. More marked reactions of the same character (P_2) while not of the same significance as nodulation, were much more important. Their significance varied from industry to industry. With stable occupational groups any degree of linear exaggeration was of value in studying the evolution of pulmonary disease.

Experience had shown that both the pathological and roentgenological criteria for determining the activity of infections associated with silicosis were still not sufficiently defined.

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Morbidity in Soap Making

APROPOS of Dr. Hayhurst's summary (page 351), older literature on occupational diseases invariably gave significant space to soap making. Ramazzini devoted his last chapter to the subject in his "De Morbis Artificum Diatriba," at the same time stating that the ancients used soap for cleaning their clothes. He refers to Pliny who wrote in his "Historia Naturali" that, "Soap, which consists of suet and ashes, was an invention of the Gauls, which nation always studied elegance and sleekness, for beautifying their hair. The best is made of beech ashes and goat suet, either thick or liquid; both are used by the Germans, but more by man than woman." W. Gilman Thompson ("The Occupational Diseases," 1914) devotes two pages to soap, margarine and stearin and mentions that mixing soap with finely powdered earth containing silica and the spicula of microscopic fossil animalculae, had lately come to his notice, and comments that the operators soon became used to the bronchial irritation and ceased to cough. Outside of a briefly reported investigation in Cincinnati by Robinson and Wilson in 1916 (U.S.P.H. Bull. No. 73), and a few paragraphs on soap making which engaged 20,436 persons in the United States in 1919 (Kober and Hayhurst's "Industrial Health," 1924), recent literature on the health of soap makers appears very scanty. Indeed, the Registrar-General's Decennial Supplement for England and Wales, Occupational Mortality, 1938, does not list the industry separately. It is therefore timely to have this special study.

American Railway Surgeons

THE Program of the Fiftieth Annual Meeting of the American Association of Railway Surgeons (see 2nd cover)is as follows:

Monday, September 11:

OS CALCIS Fractures, an Improved Treatment," by OTTO W. YOERG, M.D.

"Open Reduction on Severe Fractures," by JOHN R. NILSSON, M.D.

"Contributing and Complicating Factors Entering into Railroad and Other Industrial Accidents," by D. W. WARD, M.D.

"The Use of Fixed Traction in Plaster of Paris for Fractures in the Lower Third of the Leg and Ankle Joint," by HIRAM W. ORR, M.D.

"Fracture of Tibia Involving Knee Joint," by R. C. WEBB, M.D.

"The Place of the Electrocardiograph in the Physical Examination," by J. ROSCOE MILLER, M.D.

"Eye Injuries and Their Management," by SANFORD GIFFORD, M.D.

"Clinical Significance of Renal and Urethral Anomalies," by VINCENT J. O'CONOR, M.D.

"Pertrochanteric Fractures," by J. J. CALLAHAN, M.D.

"Certain Aspects of Skull Fracture Management," by HARRY E. MOCK, M.D.

"Clinical Suggestions on Intestinal Obstruction," by A. H. MONTGOMERY, M.D.

Tuesday, September 12:

TRIGEMINAL Neuralgia, Accurate Differential Section, with the Preservation of the Ophthalmic Branch," by ROLAND M. KLEMME, M.D.

"Obligation of Railway Surgeon," C. A. WALKER, M.D.

"The Role of the Railroad Hospital Laboratory in the Control of Syphilis," by EDWARD M. BUTT, M.D.

"Conservative Treatment of Fractures," by EDWIN W. RYERSON, M.D.

"Routine Neurological Examination," by GEORGE W. HALL, M.D.

"Traumatic Injuries Causing Difficulties in Diagnosis," by J. J. KEARNS, M.D.

"The Management of Compound Injuries of the Face and Jaws," by JAMES B. BROWN, M.D.

"Subtemporal Decompression; Indications and Surgical Technique," by ERIC OLDBERG, M.D.

"Treatment of the Elbow," SAMUEL S. MATHEWS, M.D.

"Fractures of Transverse Processes of Lumbar Vertebrae," by R. M. DODSON, M.D.

"Hoarseness: Color Motion Picture Illustrating Surgical Pathology of the Larynx," by PAUL H. HOLINGER, M.D.

Wednesday, September 13:

SUBTROCHANTERIC Osteotomy for Fresh and Old Fractures of the Neck of the Femur," by FRANK G. MURPHY, M.D.

"The Principals Involved in the Operation for Internal Fixation of Fractures of the Neck of the Femur," by RALPH G. CAROTHERS, M.D.

"Pathological Fractures in Relation to Industry," by JOHN H. ALEXANDER, M.D.

"Injuries to the Semi-lunar Cartilage," by HARRY V. SPAULDING, M.D.

"The Danger of the Indiscriminate Use of the Barbiturates," by HARRY H. DRYSDALE, M.D.

"Fractures of the Spine," by HAROLD H. BAKER, M.D.

"Prediction of Coronary Accidents," by GORDON B. MYERS, M.D.

"Calibrated Skin Grafts of Intermediate Thickness," by EARL C. PADGETT, M.D.

"Differential Diagnosis and Treatment of Frost Bite and Its Relation to Buerger's Disease," FRANK V. THEIS, M.D.

INDUSTRIAL HEALTH AND DISEASE

"Apples and Doctors"

A. D. Britton, M.D.
Medical Supervisor,
American Mutual Liability Insurance Company.

YOU know the old saying about what apples do for doctors.* However, this is not true in the modern industrial world. If you bought the entire apple crop of the United States you couldn't keep doctors away from your factory, your store, your mill or wherever you employ men and women. Accidents would still occur, and these men and women, the victims of these accidents, would need the most skillful medical service that you could find. It behooves you, therefore, to know something of the relationship and responsibility involved in this triangle in industry—the employer, the doctor and the insurance carrier, in which your employee stands in the center.

Before there were Compensation Laws, if a man was hurt in your employ, with rare exceptions, he went to his own doctor or to one brought in by friend or relative or lawyer. Today the situation is very different. In 39 states, the law places upon you the duty and responsibility of selecting and furnishing a physician. In all but one of the remaining states, although your employee may choose the doctor to treat him, nevertheless you are not prevented from exercising some degree of persuasion over his choice. At least you can advise him. In one state alone, New York, you are not given any voice in the selection of the doctor; you are forbidden even to suggest a name unless requested to do so by the injured employee. In that state he may go to any one of 17,000 or more doctors regardless of whether he has a cut finger or a fractured leg, regardless of whether the doctor is an obstetrician or an osteopath.

In the industrial world today, the relationship between doctor, employer and insurance company is most complex. It is difficult at times to walk the straight path between loyalties that appear to clash. The first duty of the doctor is of course to his patient. No one denies that. But with this goes a duty to you as the employer of the patient and a duty to society. The man deserves the best skill and care of which the doctor is capable. The doctor must not exaggerate the condition of his patient for the patient's financial benefit, and he must return him to his job as quickly as he can.

You owe a duty to the man or woman hurt in your employ. You owe him or her the best medical care. You also owe a duty to yourself, to your stockholders and to industry to see to it that capable and reasonable care is furnished. You pay the bill not only for the medical care, but for time lost and efficiency lost because of the accident.

The insurance company owes a duty to the doctor, to the injured person and to you, the employer, to see that the best possible medical treatment is provided, that reasonable and proper bills are promptly paid and that the victim of the accident is returned to a useful job as speedily and in as good physical condition as possible.

Perhaps the most important decision which you as an employer have to make in this scheme of compensation is the choice of physician for your employees. It is not a duty to be undertaken lightly.

The choice of a doctor should not be regarded as a chance to pay an obligation to a friend, to find an opportunity for a relative, to reward or retain a customer. There are many good doctors who are not good for this kind of work. Unless the doctor chosen is capable, conscientious and fair, both your employees and you will pay dearly. If you could but see a few of the final results where men and women have failed to go to capable doctors, results in permanent losses of fingers, hands, legs, arms, eyes and even lives which could have been avoided. These are the monuments to incompetence in industrial life today.

The doctor chosen must know industrial work, must have background and experience in such work. He must understand both the theory and practice of the Compansation Law. He must have a clear conception of the relationships and loyalties involved. He ought to know the background of the men and women—your employees—he treats. He ought to know this before he treats them—to know their jobs, the hazards and exposures of their jobs. He must be the kind of doctor who will treat not only the injury itself, but the associated problem of getting the man or woman back to work. Above all, he must know how to treat. He must realize his limitations and when to call for help.

These are not Utopian ideals. There are thousands of doctors with these qualifications today doing marvelous work in industrial surgery and medicine. Why is it important that you as an employer should pick a capable and understanding doctor for your employees? How important is this choice to you? Why should you know the provisions of the Compansation Law, the duty you owe your employees under the Law? Why should you understand something of the scope and costs of industrial medicine and surgery? Statistics are like salt. You can ruin any dish with too much, but a gentle sprinkling serves to make the dish more palatable. Here is a gentle sprinkling which may help to answer these questions. The figures are from data collected by the National Council on Compensation Insurance and by the New York Compensation Rating Board.

Out of every dollar paid in losses under the Compensation Law, approximately 42 cents[1] is paid for medical service. Translated into practical experience, this means that it is not only vastly important that the men and women who work for you have the best possible medical attention; it means also that the cost of such service is almost one-half of the total losses paid under compensation.

Mention has been made that New York now has the most drastic provision of any state with respect to free choice of medical treatment by the injured workman. Figures compiled by the Compensation Insurance Rating Board, based on a comparison of average medical and indemnity costs for the first six months in 1934 (before the amendment granting free choice), with corresponding figures for the first six months of 1936 (after the amendment), show that the average cost of all medical increased 7% and the average cost of all indemnity increased 15%.

No claim is made that this is conclusive proof, but there certainly is a clear implication that free choice of doctor has not benefited the victims of accident by lessening their disability. Commenting on this development in New York, a paragraph is quoted from the Insurance Bulletin (No. 47) issued by the Chamber of Commerce of the United States:

"The State of New York by an amendment in 1935 gave the employee the exclusive right to select a physician. The employer and his insurance carrier have no voice in the selection. Insurance companies have been by law and department rulings so completely eliminated from the field that they are prohibited from even communicating to their policyholders a list of physicians or surgeons to be called in an emergency though the physicians and surgeons whose names may appear on the list are all approved as the law requires. This amendment has greatly increased medical costs."

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* *American Mutual Magazine*, April, 1939.

1. This estimate is based on a group of over 2,800,000 cases reported to National Council on Compensation Insurance during 1936 and 1937.

For three years the National Council on Compensation Insurance has been collecting data from a large number of carriers throughout the country pertaining to the cost of medical and indemnity. This data, covering almost two and one-half million cases, shows conclusively that the average cost of both medical and indemnity is lower on cases treated by doctors selected or approved by the employer or insurance carrier. Again quoting from the same Insurance Bulletin:

"Competent medical attention will restore the injured employee to industry more quickly than improper treatment, and hence shorten the period of compensation benefits. The Medical Cost Study Plan by the National Council on Compensation Insurance shows an increased cost in cases where the employee is permitted free choice of the physician."

In many states you have a legal responsibility to furnish capable medical care. Beyond this, everywhere you have a moral responsibility toward those who work for you. You are vitally concerned in their welfare. To help you meet these legal and moral obligations, the American Mutual Liability Insurance Company has organized a staff of industrial physicians and surgeons. This staff has been built through many years of experience in handling Compensation cases. The doctors know the problems of industrial medicine and surgery. Today this group contains the names of over 4000 doctors, many of whom have been associated with our Company for two decades. The methods of treatment and the end results of treatment by these doctors are studied. The costs are analyzed. From the experience thus gained, we believe that we are qualified to offer to you, as employers of labor, certain suggestions which may be helpful to you and to the men and women who work for you.

1. Let the Insurance Company consult with you in the selection of the doctors who are to treat your industrial accidents.
2. Cooperate with the Insurance Company to the fullest extent in the use of the doctors selected.
3. Become acquainted with these doctors: Learn their qualifications, watch their work, be familiar with the fees they charge.
4. Help the doctor to learn something about your plant the place where your work is carried on, its operation, the exposures and hazards incidental to its operation.
5. Help the doctor to know your employees, the conditions under which they work and live.
6. When a man is injured, see that he goes to a doctor promptly if the injury is serious enough to require a doctor's attention. If in doubt, send him to the doctor. It is better that 10 should go when a dab of mercurochrome might suffice than that one should lose a finger, hand or arm that might have been saved through prompt attention.
7. Above all, select your doctor because he is capable and efficient, because he is fair, because he knows industrial work and for no other reason.

Continued from page 8—

ner the names of the speakers assure. There are further details of this important event in the DR. TINLEY'S invitation on the 2nd cover. . . . THE Medical Supervisor of an insurance company, in "Apples and Doctors" (p. 363) looks at industrial medicine, and sets forth what he sees—with a combination of inside and outside points of view. The result is exceedingly interesting . . . . So concludes the August issue. It isn't as bulky as some other issues. But on the whole, we still believe that while INDUSTRIAL MEDICINE—as the chap said of the 36-mile railroad of which he was chief engineer—"may not be as long as some, it's just as wide as any!"

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